SOIL SURVEY OF

Northern Santa Barbara Area, California

U. S. Department of Agriculture
Soil Conservation Service
In cooperation with
University of California
Agricultural Experiment Station

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The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the Area in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the page for the range site in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the properties, and information about soil features that affect engineering practices and sites for nonindustrial buildings.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation and Classification of the Soils."

Newcomers in the Northern Santa Barbara Area may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the Area given in the section "General Nature of the Area."

Cover Picture

Santa Maria in the Santa Maria Valley. In foreground are Metz, Mocho, and Sorrento soils.

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Figure 1.--Location of the Northern Santa Barbara Area in California.

The Area occupies about 830,870 acres, or 1,298 square miles. About 150,000 acres consists of valleys or low terraces. Much of this acreage is intensively used for irrigated and dryfarmed crops. The climate is mild and the soils are suited to a wide variety of flower, orchard, truck, and field crops. The rest of the Area consists of high

Lompoc valleys are packed, both fresh and frozen, at numerous plants. The production of flower seeds in the two valleys is the largest in the world. Alfalfa dehydrators for making alfalfa pellets for export have been installed near Santa Maria. A large sugar plant is at Betteravia. Byproducts from this plant provide large amounts of feed for cattle. Several dairy plants are in the coastal part of the Area.

In the Santa Ynez Mountains, south of Lompoc, two companies mine diatomaceous earth from one of the largest deposits in the world. Several large oilfields are in operation in the vicinity of Santa Maria and in the Solomon and Purisima Hills, and two large oilfields are in operation in the Cuyama Valley. Deposits of lightweight shale, in the Casmalia Hills southwest of Santa Maria, are mined, processed, and sold as lightweight aggregate. Flagstones are dug from a quarry in the Monterey Shale Formation in Tepusquet Canyon, and a quarry in Pine Canyon supplies rock from the Franciscan Formation for use in constructing roads and levees.

Manufacturing is becoming an important part of the economy of the Area. There are oil refineries,

All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Bayshore loam, drained, is one of several phases within the Bayshore series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map in the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Terrace escarpments, cobbly, is a land type in the Northern Santa Barbara Area.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way as to be

The terms for texture used in the title of the associations apply to the surface layer. For example, in the title for association 1, the words "sandy loams to silty clay loams" refer to texture of the surface layer.

Somewhat Excessively Drained to Somewhat Poorly Drained Nearly Level to Moderately Steep Soils of the Alluvial Fans, Flood Plains, Valleys, and Terraces

The three soil associations in this group make up about 19 percent of the Northern Santa Barbara Area. They are on alluvial fans and flood plains, in valleys, and in small areas on low terraces. The soils are somewhat excessively drained to somewhat poorly drained loamy sands to silty clay loams that formed in alluvium derived mostly from sedimentary rock.

Elevations range from near sea level to 2,500 feet. The average annual rainfall is 6 to 22 inches, and the average annual air temperature is about 58° to 60° F. The frost-free season is 180 to 365 days.

litos, Elder, Metz, and Salinas soils, and Riverwash and Sandy alluvial land.

Sorrento soils are well drained. The surface layer is grayish-brown sandy loam to clay loam. It is underlain by pale-brown and light yellowish-brown, calcareous sandy loam to clay loam.

Mocho soils are well drained. They are grayish-brown, calcareous sandy loam to silty clay loam throughout the profile.

Camarillo soils are somewhat poorly drained. The surface layer is brown and grayish-brown, calcareous sandy loam to silty clay loam. It is underlain by mottled grayish-brown to light yellowish-brown, stratified, calcareous sandy loam to clay loam. The content of soluble salts ranges from low to high. In places a seasonal water table is at a depth of 2 to 5 feet or more.

These soils are among the most productive in the Area. They are used for many kinds of truck and field crops and for cut flowers. Camarillo soils are also used for artichokes. Some areas, particularly those adjacent to the major rivers, are subject to occasional flooding.

3. Panoche-Metz-Stutzville Association

Nearly level to moderately sloping, somewhat excessively drained to somewhat poorly drained loamy sands to silty clay loams on flood plains and alluvial fans

This association is on alluvial fans and flood plains in the Cuyama Valley. The soils formed in very deep alluvium derived from sedimentary rock. Slopes are 0 to 9 percent. The plant cover consists of annual grasses, forbs, California sagebrush, and salt-tolerant plants. Elevations range from 1,800 to 2,500 feet. The average annual rainfall is 6 to 12 inches, and the average annual air temperature is 58° to 59° F. The frost-free season is 180 to 260 days.

This association makes up about 6 percent of the survey area. It is about 40 percent Panoche soils, 35 percent Metz soils, and 10 percent Stutzville soils. The rest is mainly Wasioja soils and Riverwash.

Panoche soils are well drained. The surface layer is pale-brown, calcareous sandy loam or loam.

4. Betteravia-Garey Association

Nearly level to moderately steep, moderately well drained and well drained loamy sands to sandy loams on terraces

This association is south of Santa Maria. The soils formed in wind-modified sands on marine terraces. Slopes are 0 to 30 percent. The plant cover consists of annual grasses and forbs and scattered brush. Elevations range from near sea level to 1,000 feet. The average annual rainfall is 12 to 18 inches, and the average annual air temperature is 57° F. The frost-free season is 250 to 340 days.

The association makes up 4 percent of the survey area. It is about 30 percent Betteravia soils and 30 percent Garey soils. The rest is mainly Betteravia, dark variant, Corralitos, Marina, and Oceano soils.

Most of this association is within the Vandenberg Air Force Base and is used primarily by the military.

6. Positas-Ballard-Santa Ynez Association

Nearly level to moderately steep, well drained and moderately well drained fine sandy loams to clay loams on terraces

This association is near Santa Ynez, Los Olivos, and Lake Cachuma. The soils formed in alluvium derived from sedimentary rocks. In some areas they are shallow to moderately deep over a clay or gravelly clay subsoil. In other areas they are very deep over a gravelly loam subsoil. Slopes are 0 to 30 percent. The plant cover consists of grasses, forbs, and scattered oaks. Elevations range from 400 to 1,000 feet. The average annual rainfall is 15 to 20 inches, and the average annual air temperature is 58° to 60° F. The frost-free season is 260 to 320 days.

percent. The plant cover consists of annual grasses, forbs, shrubs, and scattered oaks and junipers. Elevations range from 2,000 to 3,500 feet. The average annual rainfall is 5 to 10 inches, and the average annual air temperature is 58° to 65° F. The frost-free season is 180 to 260 days.

This association makes up 5 percent of the survey area. It is about 40 percent Kettleman soils and 30 percent Wasioja soils. The rest is mainly Metz and Panoche soils in small valleys.

Kettleman soils have a surface layer of light brownish-gray, calcareous fine sandy loam that is underlain at a depth of 6 to 30 inches by soft calcareous sandstone.

Wasioja soils have a surface layer of pale-brown and light yellowish-brown fine sandy loam or cobbly fine sandy loam. The subsoil is yellowish-brown and light yellowish-brown sandy clay loam and clay loam that is underlain by yellow loamy sand.

This association is used mostly for range. Small areas of more gently sloping soils are used for dryland grain.

survey area. The soils are well-drained and somewhat excessively drained sands to clays that formed in material weathered mostly from sedimentary rock but partly from igneous rock.

Elevations range from 200 to 3,500 feet. The average annual rainfall is 8 to 30 inches, and the average annual air temperature is 58° to 60° F. The frost-free season is 180 to 325 days.

These associations are used mostly for range, wildlife habitat, and watershed. Small areas of gently sloping soils are used for dryland field crops and for irrigated specialty crops.

9. Chamise-Arnold-Crow Hill Association

Gently sloping to very steep, well-drained and somewhat excessively drained sands to clay loams on high terraces and uplands

This association is in the Solomon Hills and the Purisima Hills in the central part of the survey area. It extends from just south of the Santa Maria in an area northeast of the Cachuma Dam Site, and in an area south of Lompoc. The soils formed in material weathered from diatomaceous shale or calcareous shale. Slopes are 9 to 75 percent. The plant cover consists of annual grasses, forbs, and scattered oaks. Brush grows on the steeper areas. Elevations range from 200 to 3,000 feet. The average annual rainfall is 8 to 30 inches, and the average annual air temperature is 58° to 60° F. The frost-free season is 180 to 300 days.

This association makes up 16 percent of the survey area. It is about 35 percent Shedd soils, 30 percent Santa Lucia soils, and 10 percent Diablo soils. The rest is mainly Chamise, Contra Costa, Diablo, Elder, and Los Osos soils and Sedimentary rock land.

Shedd soils have a surface layer of pale-brown and light-gray, highly calcareous silty clay loam that is underlain by calcareous shale at a depth of 20 to 54 inches.

Santa Lucia soils have a surface layer of very dark gray shaly and very shaly clay loam about 20 to 44 inches thick over hard, weakly fractured, diatomaceous shale.

12. Los Osos-Gaviota Association

Moderately sloping to very steep, well-drained and somewhat excessively drained clay loams to sandy loams on uplands

This association is in the Santa Ynez Mountains along the southern border of the survey area. The soils formed in material weathered from shale and sandstone. Slopes are 5 to 75 percent. The plant cover consists of annual grasses, forbs, and oaks. Elevations range from 400 to 3,500 feet. The average annual rainfall is 10 to 25 inches, and the average annual air temperature is 59° to 60° F. The frost-free season is 190 to 320 days.

This association makes up 8 percent of the survey area. It is about 35 percent Los Osos soils and 25 percent Gaviota soils. The rest is Contra Costa, Crow Hill, Diablo, Linne, Lodo, San Benito, Santa Lucia, and Shedd soils.

13. Sedimentary Rock Land-Rough Broken Land Association

Steep to very steep, well-drained and somewhat excessively drained clay loams to sandy loams on uplands

This association is in the Santa Ynez Mountains along the southern border of the survey area. The soils formed in material weathered from shale and sandstone. Slopes are 30 to more than 75 percent. The plant cover consists of scattered brush and patches of annual grasses and forbs. Elevations range from 200 to 4,000 feet. The average annual rainfall is 8 to 25 inches, and the average annual air temperature is 57° to 63° F. The frost-free season is 195 to 325 days.

This association makes up 10 percent of the survey area. It is about 60 percent Sedimentary rock land and 35 percent Rough broken land. The rest is isolated areas of deeper, less sloping soils.

Sedimentary rock land consists of about 10 inches or less of soil material over hard sandstone and shale. Rock outcrop covers 30 percent or more of the area. Slopes are 60 to more than 75 percent.

Rough broken land consists of less than 10 inches of soil material over soft sandstone or semi-consolidated gravelly sediments. Slopes are 30 to more than 75 percent. These areas are highly erosive and contribute large amounts of sediment to lower lying areas.

This association is used only for watershed.

Soil	Area	Extent
	Acres	Percent
Agueda loam, 0 to 2 percent slopes	270	(1/)
Agueda silty clay loam, 0 to 2 percent slopes	705	0.1
Agueda silty clay loam, 2 to 9 percent slopes	424	(1/)
Arnold sand, 5 to 15 percent slopes	5,932	.7
Arnold sand, 15 to 45 percent slopes	29,443	3.5
Arnold sand, 9 to 45 percent slopes, severely eroded	2,077	.3
Ballard fine sandy loam, 0 to 2 percent slopes	1,255	.2
Ballard fine sandy loam, 2 to 9 percent slopes	2,242	.3
Ballard fine sandy loam, 9 to 15 percent slopes	333	(1/)
Ballard gravelly fine sandy loam, 0 to 2 percent slopes	838	.1
Ballard gravelly fine sandy loam, 2 to 9 percent slopes	1,955	.2
Ballard gravelly fine sandy loam, 9 to 15 percent slopes	1,001	.1
Ballinger silty clay, 15 to 30 percent slopes	2,569	.3
Ballinger silty clay, 30 to 45 percent slopes	553	.1
Ballinger silty clay, 45 to 75 percent slopes	1,065	.1
Bayshore loam, drained	933	.1

Contra Costa-Lodo loams, 15 to 30 percent slopes	656	.1
Contra Costa-Lodo loams, 30 to 45 percent slopes	1,764	.3
Contra Costa-Lodo loams, 45 to 75 percent slopes	4,153	.5
Contra Costa-Lodo stony loams, 30 to 75 percent slopes	4,191	.5
Corralitos sand, 0 to 2 percent slopes	1,026	.1
Corralitos sand, 2 to 15 percent slopes	3,101	.4
Corralitos sand, 9 to 15 percent slopes, eroded	634	.1
Corralitos loamy sand, 0 to 2 percent slopes	3,810	.5
Corralitos loamy sand, 2 to 9 percent slopes	2,967	.4
Corralitos loamy sand, 9 to 15 percent slopes	1,406	.2
Cropley silty clay	754	.1
Crow Hill loam, 15 to 30 percent slopes	1,172	.1
Crow Hill loam, 30 to 45 percent slopes	5,636	.7
Crow Hill loam, 45 to 75 percent slopes	4,890	.6
Crow Hill loam, 15 to 75 percent slopes, severely eroded	1,645	.2
Diablo silty clay, 9 to 15 percent slopes	1,064	.1
Diablo silty clay, 15 to 30 percent slopes	2,265	.3
Diablo silty clay, 30 to 45 percent slopes	4,029	.5
Diablo silty clay, 15 to 45 percent slopes, severely eroded	323	(1/)
Diablo silty clay, 45 to 75 percent slopes	585	.1
Dune land	12,029	1.5
Elder sandy loam, 0 to 2 percent slopes	364	(1/)
Elder sandy loam, 0 to 2 percent slopes, eroded	691	.6
Elder sandy loam, 2 to 9 percent slopes, eroded	4,675	.6

Los Osos San Benito clay loams, 30 to 45 percent slopes	10,982	1.3
Los Osos-San Benito clay loams, 30 to 75 percent slopes, severely eroded	1,596	.2
Marina sand, 0 to 2 percent slopes	2,938	.4
Marina sand, 2 to 9 percent slopes	7,905	1.0
Marina sand, 9 to 30 percent slopes	9,803	1.2
Marina sand, 9 to 30 percent slopes, severely eroded	1,394	.2
Marsh	659	.1
Maymen stony loam, 45 to 75 percent slopes	3,538	.4
Metz loamy sand, 0 to 2 percent slopes	8,488	1.0
Metz loamy sand, overflow, 0 to 2 percent slopes	1,941	.3
Metz loamy sand, 2 to 9 percent slopes	626	.1
Metz loamy sand, 2 to 9 percent slopes, eroded	7,345	.9
Mine pits and dumps	1,632	.2
Mocho sandy loam, overflow	605	.1
Mocho sandy loam, sandy substratum	572	.1
Mocho sandy loam, sand substratum, overflow	1,097	.1
Mocho fine sandy loam	2,281	.3
Mocho loam	3,243	.4
Mocho loam, overflow	408	(1/)
Mocho silty clay loam	4,323	.5
Montara rocky clay loam, 30 to 75 percent slopes	908	.1
Narlon sand, 0 to 5 percent slopes	1,977	.2
Narlon loamy sand, 0 to 2 percent slopes	1,214	.1
Narlon loamy sand, 2 to 9 percent slopes	2,099	.3

San Andreas-Tierra complex, 9 to 45 percent slopes, severely eroded	1,745	.2
San Andreas-Tierra complex, 15 to 30 percent slopes	6,729	.8
San Andreas-Tierra complex, 30 to 75 percent slopes	11,119	1.3
San Benito-Diablo complex, 30 to 45 percent slopes	875	.1
San Benito-Diablo complex, 45 to 75 percent slopes	1,143	.1
Sandy alluvial land	10,817	1.3
Sandy alluvial land, wet	855	.1
Santa Lucia shaly clay loam, 9 to 15 percent slopes	262	(1/)
Santa Lucia shaly clay loam, 15 to 30 percent slopes	1,161	.1
Santa Lucia shaly clay loam, 15 to 45 percent slopes, eroded	605	.1
Santa Lucia shaly clay loam, 30 to 45 percent slopes	11,690	1.4
Santa Lucia shaly clay loam, 45 to 75 percent slopes	18,764	2.2
Santa Ynez gravelly fine sandy loam, 2 to 9 percent slopes	3,300	.4
Santa Ynez gravelly fine sandy loam, 9 to 15 percent slopes	1,063	.1
Santa Ynez clay loam, 2 to 9 percent slopes	740	.1
Santa Ynez clay loam, 9 to 30 percent slopes	1,003	.1
Sedimentary rock land	44,205	5.3
Shedd silty clay loam, 15 to 30 percent slopes	1,980	.2
Shedd silty clay loam, 30 to 45 percent slopes	5,118	.6
Shedd silty clay loam, 30 to 75 percent slopes, severely eroded	22,999	2.7
Shedd silty clay loam, 45 to 75 percent slopes	13,472	1.6
Shedd silty clay loam, diatomaceous variant, 15 to 30 percent slopes	439	.1
Shedd silty clay loam, diatomaceous variant, 30 to 45 percent slopes	2,763	.3

Wasioja cobbly fine sandy loam, 2 to 9 percent slopes	1,912	.2
Wasioja cobbly fine sandy loam, 9 to 45 percent slopes	6,473	.8
Water	3,032	.4
Total	830,870	100.0

loam, black (10YR 2/1) when moist; weak, coarse, prismatic breaking to strong, fine, granular structure; hard, friable, sticky and plastic; many very fine, fine, and medium roots; many micro and very fine interstitial pores and many very fine and fine tubular pores; strongly effervescent; disseminated lime and lime in filaments and threads; moderately alkaline (pH 8.0); diffuse, irregular boundary.

AC--42 to 55 inches, dark-gray (10YR 4/1) silty clay loam with sparse grayish-brown (10YR 5/2) blotches, pale brown (10YR 6/3), very dark gray (10YR 3/1), dark grayish brown (10YR 4/2), and grayish brown (10YR 5/2) when moist; few, fine, prominent, dark reddish-brown (5YR 3/3d) mottles in lower half of horizon; weak, medium, subangular blocky breaking to strong, fine and medium, granular structure; hard, firm, sticky and plastic; common very fine and fine roots; many very fine interstitial pores and many fine and medium tubular pores; strongly efferves-

Agueda loam, 0 to 2 percent slopes (AdA).--This soil has a profile similar to the one described as representative for the series except that the surface layer is dark-gray loam, 30 to 40 inches thick, over light-colored fine sand. This soil occurs along Green Canyon Creek west of Santa Maria.

Included in mapping are small areas of Agueda loam that do not have a sand substratum, and small areas of Salinas soils that are underlain by sand.

This soil is moderately permeable above the sand layer and rapidly permeable in the sand. Surface runoff is very slow, and the erosion hazard is none to slight. The available water capacity is 6.0 to 7.5 inches. Fertility is high. The effective rooting depth is 30 to 40 inches and is limited by the sand layer.

This soil is used for most of the irrigated crops grown in the Area. Lime-induced chlorosis is a problem for the more lime-sensitive crops. Capability unit IIs-0(14).

range site.

Arnold Series

The Arnold series consists of somewhat excessively drained sands that developed over soft sandstone. These soils occur in widely scattered areas south and west of Orcutt, in the Vandenberg Air Force Base, and in the vicinity of Los Alamos. Slopes range from 5 to 45 percent. Arnold soils occur at elevations of 200 to 1,500 feet. The average annual rainfall is 14 to 18 inches, the average annual air temperature is 58° F., and the frost-free season is 260 to 300 days. Arnold soils are associated with Oceano, Marina, Narlon, and Tangair soils.

In a representative profile, the soil is light-brown to very pale brown sand about 55 inches thick. It is underlain by very pale brown, soft, porous sandstone that can be dug with hand tools. Reaction is medium acid to strongly acid.

Vegetation varies widely on the Arnold soils. On north-facing slopes there is generally a dense growth of oak trees with an undercover of sparse

few very fine roots; many very fine interstitial pores; strongly acid (pH 5.1); gradual, smooth boundary.

C2--39 to 55 inches, very pale brown (10YR 8/3) sand, pale brown (10YR 6/3) when moist; single grain; loose, nonsticky and nonplastic; very few fine roots; many very fine interstitial pores; strongly acid (pH 5/5); gradual, wavy boundary.

C3--55 inches, very pale brown (10YR 7/3) very soft sandstone, reddish yellow (7.5YR 6/6) when moist; very easily cut with hand tools, only slightly more firm than C2 horizon; includes 10 percent subangular pieces of brown (7.5YR 5/4) hard sandstone, 2 to 8 inches across; yellowish red (5YR 5/6) when moist; continuous moderately thick clay films as bridges and in pores of hard fragments; fragments are extremely firm when moist, in the upper part, to firm when moist at depths below 60 inches.

A few indistinct pockets in the C horizon of this profile are filled with material from the A horizon, and the A13 horizon has similar pockets filled with material from the C horizon.

Sandstone is 20 to 30 inches.

Included in mapping are small areas of Chamise, Crow Hill, Linne, San Andreas, and Santa Lucia soils. Also included are areas shallower than 20 inches, and areas where sandstone rock crops out.

Permeability is rapid. Surface runoff is rapid, and the erosion hazard is high. This soil is severely rilled and gullied. Many areas are sharply dissected and have steep uneven slopes and sharp ridgetops. The available water capacity is 1.0 to 2.0 inches, and the effective rooting depth is 20 to 30 inches. Fertility is very low.

This soil has limited use as range. Because the erosion hazard is high, the soil contributes large amounts of sand and silt to lower lying areas. Capability unit VIIe-4(15); Eroded or Shallow Sandy range site.

Ballard Series

The Ballard series consists of well-drained fine sandy loams and gravelly fine sandy loams that formed in alluvium derived from acid shale and

2/2) when moist, weak, fine and medium, granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common micro and very fine roots; many very fine interstitial pores and many fine and medium tubular pores; slightly acid (pH 6.2); clear, wavy boundary.

B1--18 to 34 inches, light yellowish-brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) when moist; massive; hard, friable, slightly sticky and slightly plastic; common micro and very fine roots; many micro interstitial pores and common very fine and fine tubular pores; few thin clay films in pores, few thin colloidal stains on mineral grains; slightly acid (pH 6.2); clear, wavy boundary.

B2t--34 to 44 inches, yellowish-brown (10YR 5/4) gravelly heavy loam, dark yellowish brown (10YR 4/4) when moist; massive; hard, friable, sticky and slightly plastic; few micro and very fine roots; many micro interstitial pores and common very fine and fine tubular pores; common moderately thick clay films in pores;

442-595 O - 72 - 2

Ballard fine sandy loam, 0 to 2 percent slopes (BaA).--This soil is nearly level and occurs on terraces in the Santa Ynez Valley along the Santa Ynez River. It has a profile similar to the profile described as representative for the series except that the surface layer is brown fine sandy loam that is less than 15 percent gravel.

Included in mapping are small areas of Chamise and Elder soils and of gravelly Ballard soils.

Permeability is moderate. Surface runoff is very slow, and the erosion hazard is slight. Fertility is moderate. The available water capacity is 7.5 to 9.0 inches, and the effective rooting depth is more than 60 inches.

This Ballard soil is used for annual pasture and range and for dryfarmed grain. Where irrigation water is available, the soil is used for irrigated orchards, corn silage, sugar beets, dry lima beans, alfalfa, and pasture. Capability unit I-1(14); Loamy range site.

Ballard fine sandy loam, 2 to 9 percent slopes (BaC).- This soil has a profile similar to the one described as representative for the series except that the surface layer is brown fine sandy loam that is less than 15 percent gravel.

Included in mapping are small areas of Chamise and Elder soils and of nongravelly Ballard soils.

Permeability is moderate. Surface runoff is very slow, and the erosion hazard is none to slight. Fertility is moderate. The available water capacity is 6.0 to 7.5 inches. The effective rooting depth is more than 60 inches.

This Ballard soil is used for irrigated orchards, silage corn, lima beans, sugar beets, and alfalfa hay and pasture. It is also used for dryfarmed hay and grain, and for annual pasture and range. Capability unit IIs-4(14); Loamy range site.

Ballard gravelly fine sandy loam, 2 to 9 percent slopes (BbC).--This soil has the profile described as representative for the series. It is gently sloping to moderately sloping and occupies terraces at slightly higher elevations than the valleys. Slopes normally are 3 to 4 percent but range to 9 percent.

Included in mapping are small areas of Chamise, Elder, Positas, and Santa Ynez soils. Also included are areas of Ballard soils that are nongravelly and of Ballard soils that are 35 to 60 percent gravel.

western edge of Cuyama Valley at the Kern and Ventura County lines. Slopes range from 15 to 75 percent. The vegetation is sparse grasses and forbs. Elevations range from 1,800 to 3,000 feet. The average annual air temperature is about 58° F., the average annual rainfall is 6 to 12 inches, and the frost-free season is 180 to 250 days. Ballinger soils are associated with Kettleman and Shedd soils.

In a representative profile, the surface layer is pale-brown silty clay about 15 inches thick. The underlying layers are predominantly yellowish-brown and grayish-brown silty clay. At about 36 inches is grayish-brown and olive-gray mudstone. Salt and gypsum crystals occur in seams and nodules throughout the soil but are more prominent in the lower part and in the mudstone.

The Ballinger soils are used for range and wildlife.

Representative profile of the Ballinger series (approximately 12 miles west of New Cuyama on Highway No. 166, 1.3 miles south on ranch road, and 100 feet west on hillside):

with beds of olive gray (5Y 4/2), very dark grayish brown (2.5Y 3/2) and olive (5Y 5/4) when moist; fractured, softens to silty clay when wet and rubbed.

Typically, the A1 horizon is pale brown but ranges to light yellowish brown where the soil is eroded or shallow. In most areas, the content of soluble salt is 0.1 to 0.3 percent in the A horizon and 0.4 to 0.5 percent in the substrata. In the more barren and dry areas in the eastern part of the Cuyama Valley, the content of soluble salt is 0.4 to 1.0 percent in the A horizon and more than 1.0 percent in the substrata. In all areas the soils have thick seams of gypsum crystals in cracks and on ped faces. In some areas numerous fragments of gypsum crystals are on the surface and in the profile. Based on laboratory analysis, the content of gypsum in the profile ranges from 8 to 20 percent. Depth to mudstone ranges from 18 inches to about 40 inches.

land.

Permeability is slow. Surface runoff is very rapid, and the erosion hazard is very high. Fertility is very low. The available water capacity is 2.5 to 4.0 inches, and the effective rooting zone is 18 to 26 inches.

This Ballinger soil is used for very limited grazing (pl. I, top). Capability unit VIIe-9(15); Gypsum Hills range site.

Bayshore Series

The Bayshore series consists of somewhat poorly drained to poorly drained silty clay loams and loams that formed in recently deposited alluvium derived from calcareous sandstone and shale. These soils have slopes of 0 to 2 percent and occur on flood plains. The vegetative cover is marsh grasses, sedges, and other water tolerant plants. Elevations range from 30 to 100 feet. The average annual rainfall is 13 to 15 inches, the average annual air temperature is 59° F., and the frost-free season is

tial pores; strongly effervescent; disseminated lime and lime in fine and medium irregularly shaped seams and soft masses; moderately alkaline (pH 8.0); clear, wavy boundary.

IIC1ca--24 to 38 inches, dark grayish-brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) when moist; few fine, distinct mottles of very dark gray (10YR 3/1) and dark yellowish brown (10YR 4/4); weak, medium, subangular blocky, parting to weak, medium, granular structure; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common fine tubular pores and many micro interstitial pores; violently effervescent; disseminated lime and lime in fine, irregularly shaped filaments and soft masses; moderately alkaline (pH 8.2); clear, smooth boundary.

IIC2ca--38 to 56 inches, dark grayish-brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) when moist; common medium prominent mottles and blotches of light brownish gray (2.5Y 6/2), olive yellow (2.5Y 6/6), and white (10YR 8/2); weak, fine and medium, granular structure; hard, very friable, slightly sticky and

Included with this soil in mapping are small areas of Agueda and Salinas soils.

This soil formed under somewhat poor drainage conditions but is now artificially drained. Permeability is moderately slow. Surface runoff is very slow, and the erosion hazard is none to slight. Fertility is high. The available water capacity is 8.0 to 10.0 inches, and the effective rooting depth is 48 to 60 inches. As a result of artificial drainage, the water table is below a depth of 4 to 5 feet.

This soil is used for most crops grown in the Area except those affected by poor drainage (pl. I, bottom). Capability unit IIw 2(14).

Bayshore loam, sandy substratum, drained (Be).--This soil is nearly level and occupies low flood plains. It has a loam surface layer that is underlain at a depth of about 40 inches by sand. The water table is within 2 to 3 feet of the surface during the winter and drops below a depth of 6 feet in summer.

Included in mapping are small areas of Salinas and Agueda soils. Also included are small areas

This soil formed under somewhat poor drainage conditions, but ditches and tile have been installed and the water table is no longer a problem. Permeability is moderately slow. Surface runoff is very slow, and the erosion hazard is none to slight. Fertility is high. The available water capacity is 10.0 to 12.0 inches, and the effective rooting depth is more than 60 inches.

This soil is drained and is used for most crops grown in the Area. Crops such as walnuts and alfalfa do not grow so well on this soil as do sugar beets, flowers, and artichokes. Capability unit IIw-2(14).

Betteravia Series

The Betteravia series consists of moderately well drained loamy sands developed from coarse-textured, wind-modified marine sands. These soils are on low terraces, chiefly on low benches south of the Santa Maria Valley, in the northern part of the Area. Some of these terraces are dissected by drainageways. Slopes are 0 to 9 percent. The

nonsticky and nonplastic; few very fine roots; many very fine tubular pores and many very fine interstitial pores; strongly acid (pH 5/2); abrupt, wavy boundary.

B21tsi--36 to 41 inches, light yellowish-brown (10YR 6/4), weakly cemented sandy loam, brown (7.5YR 4/4) when moist; massive; very hard, very firm, slightly sticky and slightly plastic; does not slake, and softens only slightly after prolonged wetting; no roots; common very fine tubular pores and many very fine interstitial pores; few moderately thick clay films as bridges, and colloid stains on mineral grains; neutral (pH 6.7); clear, wavy boundary.

B22tsi--41 to 50 inches, reddish-yellow (7.5YR 6/6), weakly cemented heavy sandy loam, strong brown (7.5YR 5/6) when moist; massive; hard, firm, slightly sticky and slightly plastic; does not slake on wetting, not quite so cemented or firm as B21tsi horizon; no roots; common very fine tubular pores and many micro interstitial pores; few thick clay films as bridges and in

Generally the B2tsi horizon is sandy loam or sandy clay loam. In some places, clay films and clay bridges make the soil material brown or reddish brown. Depth to the B2tsi horizon ranges from 6 to 50 inches but averages about 42 inches. Local land operators call the B2tsi horizon a hardpan; the pan material does not slake upon wetting, but it does soften. In scattered areas, the pan is exposed and is indurated. In most areas, the B2tsi horizon is underlain by finer textured, yellowish-brown to reddish-brown horizons. Where these horizons contain considerable amounts of sand and sandy clay loam but no gravel, they appear to be related genetically without unconformity. Where the lower horizons are abruptly fine textured, they appear to be IIB2t horizons, but in places are more like IIC horizons. Generally, the fine-textured material has moderate structure, and there are thick clay films on the peds. In a few places the B2tsi horizon is underlain by unconforming, poorly sorted sediments.

Betteravia loamy sand, 0 to 2 percent slopes (BmA).--This nearly level soil occurs on low

sloping and occurs on low terraces. Depth to the weakly cemented subsoil averages 36 inches, but ranges from 24 to 42 inches.

Included with this soil in mapping are areas of Marina and Oceano soils.

Permeability is very slow. Surface runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is high. Fertility is very low. The available water capacity is 2.0 to 3.5 inches, and the effective rooting depth is 24 to 42 inches.

This soil is used mainly for annual pasture and range and for nonfarm purposes. Small areas are used for specialty crops such as strawberries. Capability units IVe-4(14) and VIe-4(15); Sandy range site.

Betteravia Series, Dark Variant

These variants from the Betteravia series consist of well-drained loamy sands that formed in alluvium derived from acid sandstone and diatomaceous shale. These soils are on alluvial fans and flood plains.

nonsticky and nonplastic, many very fine roots, few coarse woody roots; common medium pores and few fine and very fine interstitial pores; gopher krotovinas filled with material from the A1 horizon; slightly acid (pH 6.5); clear, smooth boundary.

B2t--26 to 38 inches, light brownish-gray (10YR 6/2) weakly cemented sandy loam, brown (10YR 4/3) when moist; massive; very hard, firm, slightly sticky and slightly plastic; few coarse and very fine roots; few fine and very fine tubular pores; few thin clay films as bridges and very few thin films on indistinct faces; medium acid (pH 6.0); gradual, smooth boundary.

B3t--38 to 50 inches, pale-brown (10YR 6/3) light sandy loam, brown (10YR 5/3) when moist; massive; hard, friable, slightly sticky and slightly plastic; very few coarse, woody roots; few thin clay films in pores, and very few thin clay films in joints; neutral (pH 6.6); gradual, smooth boundary.

C--50 to 61 inches, very pale brown (10YR 7/3) loamy sand, light yellowish brown (10YR 6/4) when moist; massive; slightly hard, very friable,

This soil is used for dryfarmed hay and grain and for annual pasture and range. Where irrigation water is available, the soil is used for alfalfa, sugar beets, lima beans, and walnuts. Capability units IVc-4(14) and IVe-4(15); Sandy range site.

Betteravia loamy sand, dark variant, 5 to 15 percent slopes, eroded (BnD2).--This soil is moderately sloping to strongly sloping and occurs in small valleys.

Included in mapping are areas of Corralitos soils. Also included are areas of soil that has a very slowly permeable clay subsoil and small areas of moderately well drained soils.

Permeability is slow. Surface runoff is medium, and the erosion hazard is moderate. Fertility is low. Available water capacity is 3.5 to 5.0 inches, and the effective rooting depth is 24 to 36 inches.

This soil is used largely for range. Small areas are used for dryland grain and beans. Irrigation water generally is not available. Capability unit IVe-4(14) and IVe-4(15); Sandy range site.

few very fine interstitial pores, common very fine pores, and few fine tubular pores; few thin clay films in tubular pores; medium acid (pH 6.0); gradual, wavy boundary.

B21t--14 to 28 inches, gray (10YR 5/1) silty clay loam, black (10YR 2/1) when moist; weak, coarse, prismatic breaking to strong, medium, angular blocky structure; extremely hard, firm, very sticky and very plastic; common very fine roots; few very fine interstitial pores and many very fine tubular pores; common thin clay films on ped faces; slightly acid (pH 6.4); gradual, smooth boundary.

B22t--28 to 41 inches, gray (10YR 5/1) silty clay loam, black (10YR 2/1) when moist; strong, medium, angular blocky structure; extremely hard, firm, very sticky and very plastic; common very fine roots; few very fine interstitial pores and common very fine tubular pores; many thin clay films on ped faces and in tubular pores; neutral (pH 6.8); gradual, smooth boundary.

Botella loam, 0 to 2 percent slopes (BoA).--This soil is nearly level and occurs in fairly broad valleys and on flood plains. It has a profile similar to the one described as representative for the series except that the surface layer is loam and the subsoil is clay loam.

Included in mapping are areas that have moderate to strong clay accumulations in the subsoil. Also included are areas of Botella loam in which as much as 20 percent of the entire profile is coarse shale fragments. Also included are areas of Botella clay loam and some areas near Los Alamos that have sand at a depth of 36 to 48 inches.

This soil is well drained. Permeability is moderately slow. Surface runoff is very slow, and the erosion hazard is none to slight. Fertility is high. The available water capacity is 10.0 to 12.0 inches, and the effective rooting depth is more than 60 inches.

This Botella soil is used for all irrigated and dryfarmed crops normally grown in the Area. Capability unit I-1(14).

60 inches.

This Botella soil is used for dryland hay, grain, and beans and for annual pasture and range. It is also used for alfalfa, sugar beets, and walnuts. Capability units IIe-1(14) and IIe-1(15); Loamy range site.

Botella loam, 2 to 15 percent slopes, eroded (BoD2).--This soil is gently to strongly sloping and is in long, narrow, irregular valleys. The surface layer is loam and the subsoil is clay loam, but otherwise this soil has a profile similar to the one described as typical for the series. The soil is cut by small to large gullies.

Included in mapping are small areas of Tierra soils and areas that have a fine sandy loam surface layer.

The soil is well drained. Permeability is moderately slow. Surface runoff is slow to medium, and the erosion hazard is slight to moderate. Fertility is high. Available water capacity is 10.0 to 12.0 inches, and the effective rooting depth is more than 60 inches.

This Botella soil is used for most crops suited to the climate in the Area. Capability unit I-1(14).

Botella clay loam, 0 to 2 percent slopes, eroded (BtA2).--This soil is nearly level. It occurs in small valleys and on fans that are subject to overflow from higher areas. Gullies are common. In some areas, deposits of unrelated soil material are on the surface.

Included in mapping are small areas of Elder soils and of Botella loam. Also included are areas that are not eroded or only slightly eroded.

This soil is moderately well drained. Permeability is moderately slow. Surface runoff from surrounding steeply sloping areas is medium, and the erosion hazard is moderate. Fertility is high. The available water capacity is 11.0 to 13.0 inches in the 60 inches of effective rooting depth.

This soil is used mostly for dryland grain and for annual pasture and range. It is also used for alfalfa, lima beans, silage corn, sugar beets, and walnuts. Capability units IIe-1(14) and IIe-1(15); Clayey range site.

Botella clay loam, wet, 0 to 2 percent slopes (BwA).--This nearly level soil is on low flood plains and alluvial fans. The largest area is near Casmalia. A water table is 1 to 2 feet below the surface in winter and falls to a depth of 4 to 5 feet late in the growing season. The lower part of the subsoil has some mottling. Otherwise this soil has a profile similar to the one described as representative for the series.

Included in mapping are some moderately saline wetland meadows. Also included is a small area near Los Alamos that is finer textured throughout the profile than is typical and is wet most of the year.

Although it is now wet, this soil formed under moderately good drainage conditions. Permeability is moderately slow. Water stands on the surface, and there is no erosion hazard. Fertility is high. The available water capacity is 11.0 to 13.0 inches for the drained profile. The effective rooting depth varies according to the fluctuations of the water table.

fine and medium roots; few very fine and fine tubular pores and many micro interstitial pores; strongly effervescent; disseminated lime; moderately alkaline (pH 8.2); clear, smooth boundary.

A12--7 to 18 inches, grayish-brown (2.5Y 5/2) very fine sandy loam, very dark grayish brown (2.5Y 3/2) when moist; massive; hard, friable, slightly sticky and slightly plastic; few micro and fine roots and common medium roots; common very fine tubular pores and many micro interstitial pores; strongly effervescent; disseminated lime; moderately alkaline (pH 8.2); gradual, smooth boundary.

A13--18 to 31 inches, brown (10YR 5/3) very fine sandy loam, dark brown (10YR 3/3) when moist; few, fine, distinct mottles of strong brown (7.5YR 5/6) and dark yellowish brown (10YR 4/4); massive; hard, friable, slightly sticky and slightly plastic; few micro and fine roots; many micro interstitial pores; strongly effervescent; disseminated lime; moderately alkaline (pH 8/2); abrupt, smooth boundary.

Texture of the A horizon varies widely from one mapped area to another and within mapped areas. It ranges from sandy loam to silty clay loam. Texture of the C horizon varies widely because of stratification, ranging from sandy loam to silty clay loam at a depth of about 10 to 36 inches; in some places there is an underlying layer of coarse material below a depth of 36 inches. The C horizon is mottled. A water table is within 5 feet of the surface at some time during the year. The water table fluctuates seasonally and at times is within a foot or two of the surface, dropping to more than 5 feet in depth late in summer and in fall. In areas that are drained artificially, the water table is maintained at depths below 5 to 6 feet.

Camarillo sandy loam (Ca).--This nearly level soil occupies flood plains. A fairly large area is in the lower Lompoc Valley within 1 or 2 miles of the ocean. Widely scattered small areas of this soil are in the Santa Maria, Lompoc, and San Antonio Valleys. This soil has a profile similar to that described as representative for the series except

Lompoc Valley within 1 or 2 miles of the ocean, and a small acreage in the San Antonio Valley. This soil has the profile described as representative for the series. Depth to the water table varies. The water table generally is within 3 feet of the surface in winter and spring and at a depth of 6 feet or more late in summer and in fall.

Included in mapping are areas of Camarillo sandy loam and areas that are underlain by sand below a depth of 30 inches.

Permeability is moderate. Surface runoff is slow, and the erosion hazard is none to slight. Fertility is high. Where the soil is drained, the capacity for holding water available to plants is 9.0 to 11.0 inches. Root penetration is limited to a depth of 3 to 5 feet by the water table.

This soil is used for annual pasture and range and to a limited extent for dryland hay and grain. Some shallow-rooted row crops are also grown on this soil. Capability unit IIw-2(14); Loamy range site.

Camarillo silty clay loam (Cd).--This soil is nearly level and occupies low flood plains in the

annual air temperature is about 58° F., and the frost-free season is 240 to 300 days. Chamise soils are associated with Tierra soils.

In a representative profile, the surface layer is dark-gray and gray shaly loam about 18 inches thick. The upper part of the subsoil is light brownish-gray shaly clay and very shaly heavy clay loam about 19 inches thick. The lower part of the subsoil is pale-brown very shaly clay loam to a depth of 60 inches and more. In places the surface layer is sandy loam, shaly sandy loam, loam, or clay loam.

Chamise soils are used mainly for range. Small areas are used for dryland hay and grain and for irrigated crops.

Representative profile of the Chamise series (1 1/4 miles south and slightly east of Luton Ranch Headquarters, approximately 11 miles north of Buellton, California):

A11 0 to 2 inches, dark-gray (10YR 4/1) shaly loam, very dark grayish brown (10YR 3/2) when moist; strong, fine, granular structure; slightly

acid (pH 5.3); diffuse, smooth boundary.

B3t--37 to 60 inches, pale-brown (10YR 6/3) very shaly clay loam, yellowish brown (10YR 5/4) when moist; brown (10YR 5/3) when rubbed; massive; very hard, firm, sticky and plastic; no roots; common very fine interstitial pores; common thick clay films line interstitial pores and coat gravels; colloidal staining on mineral grains; strongly acid (pH 5.3).

The A horizon is generally gray or dark gray and less commonly grayish brown or dark grayish brown. In a few mesalike areas it is almost brown. Texture of the A horizon ranges from sandy loam to clay loam. Thickness of the A horizon ranges from 3 to 36 inches. Content of shale fragments ranges from 5 to 50 percent in the A horizon and 50 to 90 percent in the B horizon. Near the bottom and ends of ridges, lime is commonly in the parent material. On narrow ridgetops and around the edge of most level mesas, the B horizon is exposed as rocklike ledges and is indurated.

is medium to rapid, and the erosion hazard is moderate to high. Fertility is low. The available water capacity is 3.0 to 5.0 inches, and the effective rooting depth is 24 to 40 inches.

This soil is used for range. Capability unit VIe-1(15); Loamy range site.

Chamise shaly sandy loam, 9 to 15 percent slopes (CfD).--This soil is rolling and occurs in irregularly shaped areas on dissected terraces. It has a shaly sandy loam surface layer that is 15 to 30 percent shale fragments; otherwise it has a profile similar to the one described as representative for the series.

Included in mapping are eroded areas. Also included are areas in which the surface layer is less than 15 percent or more than 30 percent shale.

Permeability is moderately slow. Surface runoff is medium, and the erosion hazard is moderate. Fertility is low. The available water capacity is 4.0 to 5.0 inches in the 32 to 44 inches of effective rooting depth.

are used for dryland grain or hay. Capability unit IVe-1(15); Loamy range site.

Chamise shaly loam, 15 to 45 percent slopes (ChF).--This soil is moderately steep to steep and occurs on dissected, old terraces (pl. II, top). It is the most extensive mapping unit in this series. This soil has the profile described as typical for the Chamise series. The surface layer is 16 to 24 inches thick.

Included in mapping are areas of Tierra soils and of Chamise sandy loam and Chamise clay loam. Also included are areas of a soil along the Cuyama River that has a brown surface layer.

Permeability is moderately slow. Surface runoff is medium to rapid, and the erosion hazard is moderate to high. Fertility is low. The available water capacity is 3.5 to 5.0 inches in the 22 to 40 inches of rooting depth.

This soil is used primarily for range. Capability unit VIe-1(15); Loamy range site.

described as typical for the series.

Included in mapping are eroded areas, and areas that have shaly loam surface layers.

Permeability is moderately slow. Surface runoff is rapid, and the erosion hazard is high. Fertility is low. The available water capacity is 5.0 to 7.0 inches in the 32 to 48 inches of effective rooting depth.

This soil is used for range. Capability unit VIe-1(15); Clayey range site.

Climara Series

The Climara series consists of well drained clays that developed on basic igneous bedrock. These soils are intermingled in a complex pattern with Toomes soils. Climara soils occur in mountainous areas near the central part of Santa Barbara County in the vicinity of Figueroa Mountain. Large and small land slips are common on these soils. Slopes

very fine roots; many very fine tubular pores; moderately alkaline (pH 8.2); clear, wavy boundary.

AC--20 to 24 inches, very dark gray (10YR 3/1) light clay mixed with gray (10YR 5/1), dark grayish brown (10YR 4/2) when moist; weak, coarse, subangular blocky structure; very hard, friable, very sticky and very plastic; few very fine roots; common very fine tubular pores; slightly effervescent; disseminated lime; moderately alkaline (pH 8.4); clear, wavy boundary.

C1ca--24 to 37 inches, light-gray (10YR 7/1) and very dark grayish-brown (10YR 3/2) silty clay loam, pale brown (10YR 6/3) and very dark brown (10YR 3/2) when moist; weak, coarse, subangular blocky structure; hard, friable, sticky and plastic; very few micro roots; many very fine tubular pores and few fine interstitial pores; violently effervescent; disseminated lime; thick lime coatings on ped faces and rocks; moderately alkaline (pH 8.4); gradual, irregular boundary.

These soils are used for range and as watershed. Capability unit VIe-5(15); the Climara soil is in Clayey range site and the Toomes soil is in Shallow Loamy range site.

Coastal Beaches

Coastal beaches (CnB) consists of narrow, sandy beaches along the Pacific Ocean that are covered or partly covered by water during high tide and exposed during low tide. Where cliffs and bluffs rise abruptly at the edge of the ocean, there are no beaches, or they are very narrow. In a few places they are gravelly or cobbly.

This land type has no value for farming. It is used for recreation. Capability unit VIIIw-4(14).

Cobbly Alluvial Land

Cobbly alluvial land (CoB) consists of long, narrow areas of recently deposited materials along drainageways in mountainous areas. The deposited material is mainly sand, gravel, and cobbles, but

In some places the soils are stony throughout the profile.

Contra Costa soils are used for range and as watershed.

Representative profile of the Contra Costa series (0.4 mile east of Twenty Mile Station, 2.5 miles south on Ranch Road near the fork of three ranch roads; SE1/4 sec. 17, T. 11 N., R. 31 W.):

A11--0 to 1 1/2 inches, brown (10YR 5/3) loam, dark brown (10YR 4/3) when moist; weak, fine and medium, granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores; neutral (pH 7.0); abrupt, smooth boundary.

A12--1 1/2 to 11 inches, brown (10YR 5/3) loam, dark brown (10YR 4/3) when moist; massive; hard, friable, slightly sticky and slightly plastic; few medium and coarse roots and common very fine roots; many very fine interstitial pores and many fine and medium tubular pores; slightly acid (pH 6.3); abrupt, wavy boundary.

Contra Costa-Lodo loams, 15 to 30 percent slopes (CrE).--This complex consists of moderately steep soils on the uplands. They are so intermingled that it was not feasible to map them separately. About 70 percent of this complex is Contra Costa loam, and about 30 percent is Lodo loam.

Included in mapping are small areas that have a clay loam surface layer. Also included are areas in which as much as 15 percent of the surface has rock outcrops.

The Contra Costa soil is well drained. Permeability is moderately slow. The available water capacity is 3.5 to 6 inches in the 20- to 36-inch root zone. Fertility is moderate.

The Lodo soil is somewhat excessively drained and is moderately permeable. The available water capacity is 2.0 to 3.0 inches in the 10- to 18-inch root zone. Fertility is low.

In both soils surface runoff is medium to rapid, and the erosion hazard is moderate to high.

These soils are used primarily for range. Capability unit VIe-1(15); Contra Costa soil is in Loamy Range site; Lodo soil is in Shallow Loamy range site.

ity is 1.5 to 2.5 inches in the 8- to 12-inch effective rooting zone.

In both soils, surface runoff is very rapid, and the erosion hazard is very high. Fertility in both soils is low.

These soils are used for range and for watershed. Capability unit VIIe-1(15); Steep Loamy range site.

Contra Costa-Lodo stony loams, 30 to 75 percent slopes (CsG).--This complex consists of steep and very steep soils on mountainous uplands. They are in such complex patterns that it was not feasible to map them separately. About 65 percent of this complex is Contra Costa stony loam, and about 35 percent is Lodo stony loam.

Included in mapping are small areas of Sedimentary rock land. Some areas of Los Osos soils and some severely eroded areas are also included.

The Contra Costa soil is well drained. Permeability is moderately slow. The available water capacity is 1.5 to 3.5 inches in the 16- to 24-inch rooting zone.

The Lodo soil is somewhat excessively drained and is moderately permeable. The available water capacity

dark brown (10YR 4/3) when moist; single grain, loose when dry and moist, nonsticky and nonplastic; many micro and very fine roots, common fine and few medium and coarse roots; many very fine pores and fine interstitial pores; medium acid (pH 6.0); abrupt, wavy boundary.

A12 -8 to 20 inches, grayish-brown (10YR 5/2) loamy sand, dark grayish brown (10YR 4/2) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots, and few medium and coarse roots; many very fine and fine interstitial pores and many very fine, fine, and medium tubular pores; medium acid (pH 6.0); gradual, irregular boundary.

A13--20 to 32 inches, grayish-brown (10YR 5/2) loamy sand, dark brown (10YR 4/3) when moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium, and coarse roots; many very fine and fine interstitial pores and many fine and common medium tubular pores; medium acid (pH 6.0); gradual, irregular boundary.

442-595 O - 72 - 3

lima beans, and walnuts. Capability units IVe-4(14) and VIe-4(15); Sandy range site.

Corralitos sand, 2 to 15 percent slopes (CtD).--This soil is gently sloping to strongly sloping and occurs on alluvial fans and in small fingering valleys. It has a profile similar to the one described as representative for the series except that this soil is sand throughout the profile.

Included in mapping are areas of Arnold and of Elder soils. Also included are areas where gullies are active and eroded materials are being deposited.

Permeability is rapid. Surface runoff is slow, and the hazard of erosion by water is slight. The hazard of soil blowing is high. Fertility is very low. The available water capacity is 2.0 to 4.0 inches. The effective rooting depth is more than 60 inches.

This Corralitos soil is used for range and for strawberries, alfalfa, and walnuts in selected areas. Capability units IVe-4(14) and VIe-4(15); Sandy range site.

the profile described as representative for the Corralitos series.

Included in mapping are areas of Arnold soils and of Corralitos sand. Also included are areas that have a sandy loam surface layer overlying the loamy sand substratum.

Permeability is rapid. Surface runoff is slow, and the hazard of erosion by water is slight. The hazard of soil blowing is high. Fertility is low. The available water capacity is 4.0 to 5.0 inches. The effective rooting depth is more than 60 inches.

This soil is used for range. To a limited extent it is used for strawberries and for other irrigated crops. Capability units IIIs-4(14) and IVe-4(15); Sandy range site.

Corralitos loamy sand, 9 to 15 percent slopes (CuD).--This strongly sloping soil occurs on the higher parts of alluvial fans. It is pale brown and stratified with sand; otherwise it has a profile that is similar to the one described as representative for the series. Although runoff water from

Ap -0 to 6 inches, very dark gray (10YR 3/1) silty clay, black (10YR 2/1) when moist; moderate, fine and medium, angular blocky structure; very hard, firm, sticky and very plastic; few very fine roots; common fine interstitial pores and few very fine tubular pores; moderately alkaline (pH 8.0); noncalcareous; clear, smooth boundary.

A11--6 to 11 inches, very dark gray (10YR 3/1) silty clay, black (10YR 2/1) when moist; moderate, fine and medium, subangular blocky structure; very hard, firm, sticky and very plastic; few very fine roots; common fine interstitial pores and few very fine and fine tubular pores; moderately alkaline (pH 8.0); noncalcareous; clear, smooth boundary.

A12--11 to 20 inches, dark-gray (10YR 4/1) silty clay, black (10YR 2/1) when moist; moderate, fine and medium, subangular blocky structure; very hard, firm, sticky and very plastic; few very fine roots; common very fine interstitial pores and few very fine tubular pores; common

deposited in recent overwash. The C horizon ranges from silty clay loam to fine sandy loam and is stratified.

Cropley silty clay (Cv).--This soil is nearly level and occurs on flood plains. It is the only Cropley soil mapped in the Area. This soil is subject to occasional overflow.

Included in mapping are areas that have a layer of material that was washed from higher lying soils and areas in which 5 to 20 percent of the entire soil profile is shale fragments. Also included are small areas of Salinas soils.

Permeability is slow. Surface runoff is slow, and the erosion hazard is none to slight. Fertility is high. The available water capacity is 8 to 10 inches for the 60 inches of rooting depth. This soil can be tilled only within a very narrow range of moisture content.

This soil is used for irrigated row crops and for dryland hay and grain. Capability unit IIs-5(14).

medium acid (pH 6.0); gradual, smooth boundary.

A12--7 to 21 inches, gray (10YR 5/1) heavy silt loam, black (10YR 2/1) when moist; weak, medium, subangular blocky, parting to moderate, coarse, granular structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine and very fine roots; and many medium roots; many very fine interstitial pores and common very fine and few fine tubular pores; medium acid (pH 5.8); gradual, wavy boundary.

B2--21 to 36 inches, gray (10YR 5/1) light silty clay loam, very dark gray (10YR 3/1) when moist; moderate, medium, subangular blocky structure; hard, friable, sticky and plastic; few fine and very fine roots and many medium roots; many very fine interstitial pores, and many very fine, few fine, and common medium tubular pores; common, thin, dark-gray clay films in pores; strongly acid (pH 5.5); this horizon is indistinct and discontinuous; small areas have bleached silt grains on ped faces; abrupt, wavy boundary.

Included in mapping are areas of an unnamed soil that has a very dark brown silty clay subsoil. Also included are small areas of Santa Lucia, Shedd diatomaceous variant, Arnold, and Chamise soils.

Permeability is moderately slow. Surface runoff is medium to rapid, and the erosion hazard is moderate to high. Fertility is moderate. The available water capacity is 4.0 to 6.0 inches in the 22 to 38 inches of rooting depth.

This Crow Hill soil is used for range and for dryland hay. Some areas are mined, and the diatomaceous earth is used for a number of industrial purposes. Capability unit IVe-1(15); Loamy range site.

Crow Hill loam, 30 to 45 percent slopes (CwF).--This soil is steep and occurs on smooth uplands and low hills. Depth to bedrock ranges from 22 to 42 inches, but averages about 26 inches.

Included in mapping are areas of Arnold and Santa Lucia soils and a small area of an unnamed soil that has a very dark brown silty clay subsoil.

Permeability is moderately slow. Surface runoff is rapid, and the erosion hazard is high. Fertility

to very rapid, and the erosion hazard is very high. Fertility is low. The available water capacity is 1.0 to 4.0 inches in the 7 to 22 inches of effective rooting depth.

This soil is used for limited range and is mined for the diatomaceous earth. Capability unit VIIe-1 (15); Shallow Loamy range site.

Diablo Series

The Diablo series consists of well-drained silty clays underlain by calcareous shale or mudstone at a depth of 20 to 40 inches. They occur on rounded hills and mountains in widely scattered areas in the western part of the survey area. Slopes are 9 to 75 percent. The vegetation is annual grasses, forbs, and a few scattered oak trees. Elevations range from 500 to 3,000 feet. The average annual rainfall is 12 to 20 inches, the average annual air temperature is about 60° F., and the frost-free season is 250 to 275 days. Diablo soils are associated with the Linne and Santa Lucia soils.

with dark-gray (10YR 4/1) and dark grayish-brown (10YR 4/2) silty clay, olive (5Y 5/3) mixed with very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) when moist; weak, fine and medium, granular structure; hard, friable, sticky and plastic; few micro and very fine roots; many very fine interstitial pores and many very fine tubular pores; strongly effervescent; disseminated lime; moderately alkaline (pH 8.2); clear, wavy boundary.

C2--35 inches, light olive-gray (5Y 6/2) mudstone wetting to silty clay texture, olive (5Y 5/3) when moist; massive; very hard, firm, sticky and plastic; very few micro roots; many very fine interstitial pores; strongly effervescent; disseminated lime; moderately alkaline (pH 8.2).

Texture of the A horizon ranges from silty clay to light clay. Depth to bedrock is typically about 36 inches but ranges from 20 inches to 40 inches. In most areas Diablo soils are underlain by partially

This soil is used mainly for range. Small areas are used for dryland hay. Capability unit IVe-5 (15); Clayey range site.

Diablo silty clay, 30 to 45 percent slopes (DaP).--This soil is steep and occurs on rounded hills. It has the profile described as representative for the series. Depth to bedrock ranges from 20 to 36 inches.

Small areas of Chamise and Shedd soils are included with this soil in mapping. Also included are small, severely eroded areas.

Permeability is slow. Surface runoff is rapid, and the erosion hazard is high. Fertility is high. The available water capacity is 4.0 to 6.0 inches, and the effective rooting depth is 20 to 36 inches.

This soil is used for range, wildlife habitat, and watershed. Capability unit VIe-5(15); Clayey range site.

Diablo silty clay, 15 to 45 percent slopes, severely eroded (DaF3).--This mapping unit occupies small scattered areas within larger areas of Diablo soils. The profile is similar to the one described

Ocean and in small areas inland within 15 miles of the coast. The most extensive areas are in the vicinity of Guadalupe and the Marshallia Ranch. Elevations range from 10 to 300 feet. Some areas are stabilized by coastal sagebrush and dune grass; other areas are active and shifting.

This land type has no value for farming but is used for recreation. Where dunes are encroaching upon cultivated land, urban developments, or military establishments, vegetation is needed to stabilize them and prevent further movement. Capability unit VIIIe-4(14).

Elder Series

The Elder series consists of well-drained sandy loams that developed in alluvium derived from acid shale and sandstone. These soils occur on flood plains and on alluvial fans. The vegetation is annual grasses, forbs, and oak trees. Slopes are 0 to 15 percent. In some areas this soil is subject to overflow from higher areas. It generally is necessary to control the overflow in order to

sticky and slightly plastic; common micro and very fine roots; many very fine interstitial pores and many very fine tubular pores; few thin colloidal stains on mineral grains; much mixing of A and C horizon material because of rodent activity; slightly acid (pH 6.5); clear, wavy boundary; a thin discontinuous gravel lens is present below this horizon.

C--35 to 72 inches, light brownish-gray (10YR 6/2) fine sandy loam, grayish brown (10YR 5/2) when moist; massive; hard, very friable, sticky and slightly plastic; few micro and very fine roots; many micro interstitial pores and many very fine and fine tubular pores; few thin colloidal stains on mineral grains; 1-inch wavy, continuous band, (10YR 4/2) when dry, (10YR 3/2) when moist; silty clay loam texture at 45-inch depth, 1/4 to 1/2-inch bands of silty clay loam at 51- and 57-inch depths; neutral (pH 7.0).

Texture of the A horizon ranges from sandy loam to loam, and color ranges from dark gray to gray. Typically, Elder soils contain shale fragments, except when water overflows from higher areas. Fertility is moderate. The available water capacity is 6.0 to 7.5 inches in the 60 inches of rooting depth.

This soil is used for irrigated and dryland crops, for range, and as wildlife habitat. Capability units IIe-1(14) and IIIe-1(15); Loamy range site.

Elder sandy loam, 2 to 9 percent slopes, eroded (EdC2).--This soil occurs in narrow valleys and on sloping alluvial fans that are subject to overflow by runoff water from higher areas. Long, deep gullies are common, especially in areas that have been cultivated. This soil has a profile similar to the one described as representative for the series except that it is stratified with coarser textured materials.

Included in mapping are small noneroded areas. Also included are areas of Botella and Corralitos soils and areas of Elder soils in which 15 to 30 percent of the entire profile is shale fragments.

Permeability is moderately rapid. Surface runoff is medium to slow, and the erosion hazard is moderate. This soil is moderately fertile. The available

slight runoff from adjacent hills. The profile is similar to the one described as representative for the series except that this soil is loam throughout the profile.

Included in mapping are small areas of Botella and Corralitos soils. Areas of Elder shaly loam and of eroded Elder soils are also included.

Permeability is moderate. Surface runoff is slow to medium, and the erosion hazard is slight to moderate. Fertility is high. The available water capacity is 9.0 to 11.0 inches in the 60 inches of rooting depth.

This soil is used for irrigated and dryland crops and for range. Capability unit IIe-1(14) and IIe-1 (15); Loamy range site.

Elder shaly loam, 0 to 2 percent slopes, eroded (EnA2).--This soil is nearly level and is subject to overflow from higher surrounding areas. It has a profile similar to the one described as representative for the series except that it is loam throughout and 15 to 35 percent of the profile is shale ified loam and sandy loam throughout and is 20 to 40 percent shale fragments. Deep gullies or deeply entrenched drainageways are common.

Included in mapping are small areas of Botella soils. Also included are areas of Elder soils in which 40 to 60 percent of the entire soil profile is shale fragments.

Permeability is moderate. Surface runoff is medium, and the erosion hazard is moderate. Fertility is moderate. The available water capacity is 6.5 to 8.5 inches in the 60 inches of rooting depth.

This soil is used mainly for range. Small areas are used for dryland grain or sudangrass. Capability unit IIIe-1(15); Loamy range site.

Garey Series

The Garey series consists of well-drained sandy loams that developed on wind-modified terraces that have been dissected by deep drainageways. These soils are south of the Santa Maria Valley. Slopes

and medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; very few very fine roots and common very fine roots in joints; very few medium and coarse woody roots; many very fine interstitial pores and common fine and very few medium tubular pores; medium acid (pH 5.6); gradual, smooth boundary.

A3--16 to 27 inches, light-brown (7.5YR 6/3) sandy loam, dark brown (7.5YR 3/3) when moist; slightly more clay than in Ap1, Ap2, and A1 horizons; massive; hard, friable, slightly sticky and slightly plastic; very few very fine roots, mostly in joints; many very fine interstitial pores and common fine and very few medium tubular pores; few thin clay films as bridges and in pores; slightly acid (pH 6.2); gradual, wavy boundary.

B21 -27 to 36 inches, light-brown (7.5YR 6/3) heavy sandy loam, dark brown (7.5YR 3/3) when moist; massive; hard to very hard, firm, slightly sticky and slightly plastic; very few very fine roots; many very fine interstitial pores, very friable, nonsticky and nonplastic; no roots; many very fine interstitial pores; weak bands 1/4 to 1/2 inch thick, 5 to 7 inches apart, continuous and wavy, reddish brown (5YR 4/3d); a few pendants of bands 1 to 1 1/2 inches long; neutral (pH 7.3), bands have same reaction.

The texture of the A horizon ranges from sandy loam to loam, and the depth to the B21 horizon ranges from 8 to 30 inches. Color of the A horizon ranges from light yellowish brown to brown. The B horizons are harder at the edge of the mesalike areas but the hardness is variable within mapping delineations. Most of the long swales are cut by shallow gullies.

Garey sandy loam, 0 to 2 percent slopes, eroded (GaA2).--This soil is nearly level and occurs on terraces that are partly dissected by deep drainageways. Shallow gullies are common in draws, and deep gullies are common near the edge of terraces. Depth to the indistinct bands is 26 to 30 inches.

as representative for the series except that this soil has a pale-brown surface layer and depth to the cemented indistinct bands is 15 to 27 inches. This soil is gullied in some places. Hardpanlike outcrops are common near the top of the terrace side slopes. The kind and degree of erosion varies within short distances.

Included in mapping are areas of an unnamed soil that has a very slowly permeable clay subsoil.

Permeability is slow. Surface runoff is medium to rapid, and the erosion hazard is high. Fertility is low. The available water capacity is 5.0 to 6.0 inches in the 60 inches of effective rooting depth. The indistinct bands restrict but do not prevent root and water penetration.

This soil is used for range. Capability unit VIe-1(15); Loamy range site.

Garey sandy loam, 5 to 30 percent slopes, severely eroded (GaE3).--This soil has a pale-brown surface layer about 8 to 15 inches thick. Rills and deep gullies are common.

Included with this soil in mapping are areas that are not so severely eroded. Some Arnold soils are

A11--0 to 5 inches, light brownish-gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) mottled with red (2.5YR 4/6) when moist; common fine, prominent mottles of red (2.5YR 5/6); massive; hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores and many very fine interstitial pores; strongly acid (pH 5.3); clear, wavy boundary.

A12--5 to 13 inches, light brownish-gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) mottled with red (2.5YR 4/6) when moist; many large, prominent mottles of reddish brown (2.5YR 4/4) and (5YR 5/4); massive; hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores and many very fine interstitial pores; strongly acid (pH 5.5); gradual, wavy boundary.

A21--13 to 21 inches, pale-brown (10YR 6/3) loam, brown (10YR 5/3) mottled with dark reddish brown (2.5YR 3/4) when moist; many medium, prominent mottles of reddish brown (2.5YR 4/4); massive; hard, friable, slightly sticky and slightly plastic; common very fine roots;

massive; hard, very firm, slightly sticky and slightly plastic; no roots; many very fine tubular pores and common very fine interstitial pores; few moderately thick clay films in tubular pores, and many thin clay bridges between mineral grains; slightly acid (pH 6.5).

The texture of the A horizon ranges from sandy loam to loam. The color and mottling of the B horizons and the degree of drainage vary with the position within the basins. The lower areas in the basins have the most severe drainage problem and are mostly mottled. Drainage is better and there is less mottling as the varriant blends into the higher lying Garey sandy loam soils. B horizons normally are heavy loam but are clay loam in some of the lowest spots. The A2 horizon normally has red concretions with black centers, 5 to 10 millimeters in diameter, that make up 1 percent of the soil mass. A few dark reddish-brown bands commonly occur in the A2 and B horizons; these bands are wavy, generally continuous, and 1/8 to 1/4 inch thick.

Garey loam, wet variant, 0 to 5 percent slopes (GbB).--This is the only variant of the Garey series mapped in the Area.

yards north of the intersection of Highway 101 and Nojoqui Road, on the east side of Highway 101 in the highway right-of-way):

A11--0 to 2 inches, brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) when moist; moderate, fine and medium, granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; slightly acid (pH 6.5); clear, smooth boundary.

A12--2 to 13 inches, brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) when moist; massive; slightly hard, friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine interstitial pores and many very fine and fine tubular pores; slightly acid (pH 6.5); gradual, irregular boundary.

AC--13 to 20 inches, brown (10YR 5/3 toward 10YR 5/4) gravelly sandy loam, dark brown (10YR 4/3) when moist; massive; hard, friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine interstitial pores, common very fine and fine tubular pores; few thin clay films and stains on mineral

This soil is well drained and moderately permeable. Surface runoff is medium to rapid, and the erosion hazard is moderate to high. Fertility is low. The available water capacity is 2.0 to 3.0 inches in the 10- to 20-inch rooting zone.

This soil is used for range, for wildlife habitat, and as watershed. Capability unit VIe-1(15); Shallow Loamy range site.

Gaviota sandy loam, 30 to 75 percent slopes (GmG).--This soil is steep to very steep and occurs on hills and mountains in the Santa Ynez Mountains, along Buckhorn Road, and in the Cuyama area. This soil has a profile similar to the one described as representative for the series except that depth to rock averages 10 to 16 inches.

Included in mapping are areas in which rock outcrops occupy 2 to 20 percent of the surface. Areas of an unnamed soil that has a loam surface and a clay loam subsoil are also included. Other included areas consist of Contra Costa, Lodo, Maymen, and Santa Lucia soils.

This soil is somewhat excessively drained and moderately permeable. Surface runoff is rapid to

A12--1 inch to 14 inches, dark grayish-brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) when moist; moderate, coarse, subangular blocky structure; strong, fine, granular material from A11 horizon filling rodent holes and making up 1/4 of the soil volume; hard, firm, sticky and plastic; many very fine roots concentrated in cracks and krotovinas; many very fine interstitial pores and few very fine tubular pores; slightly acid (pH 6.2); abrupt, smooth boundary.

A13--14 to 30 inches, dark grayish-brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) when moist; weak, coarse, subangular blocky structure; hard, firm, sticky and plastic; common very fine roots; few very fine interstitial pores and few very fine tubular pores; slightly acid (pH 6.2); gradual, irregular boundary. Lower 4.5 inches of this horizon is 50 to 80 percent rock fragments.

R--30 inches, very pale brown (10YR 7/3) fractured soft shale, with very dark grayish brown (10YR 3/2) colloidal coatings on fracture planes;

Gazos clay loam, 15 to 30 percent slopes (GsE). - The depth to rock in this soil ranges from 20 to 30 inches and averages about 28 inches.

Included in mapping are small areas of a soil that is similar to Gazos soil except that the texture is silty clay throughout the profile. Also included are some shaly Gazos soils.

Permeability is moderately slow. Surface runoff is medium to rapid, and the erosion hazard is moderate to high. Fertility is moderate. The available water capacity is 4.0 to 6.0 inches in the 20- to 30-inch rooting zone.

This soil is used for range. Capability unit IVe-1(15); Loamy range site.

Gazos clay loam, 30 to 45 percent slopes (GsF).--This soil is on hilly and mountainous areas. It has the profile described as representative for the series. Depth to rock ranges from 20 to 28 inches but averages about 26 inches.

Included in mapping is a soil that is similar to Gazos soil except that the texture is silty clay throughout the profile. Land slips are also included.

soils, and crops.

Gullied land is not suitable for farming. In some areas it is necessary to establish plant cover or to install engineering structures to slow the erosion. Capability unit VIIIe-1(14).

Igneous Rock Land

Igneous rock land (IrG) consists of very steep and extremely steep, almost barren upland areas of basic igneous rock. Rock outcrops occupy 50 to 90 percent of the surface, and the rest is small pockets of moderately fine textured soil material less than 10 inches deep. Except for scattered brush, grass, and other plants, this land type is bare of vegetation. Runoff is very rapid, and the erosion hazard is very high.

Igneous rock land is suitable for use only as a source of water. To control excessive runoff and erosion, protection from fire is needed. Capability unit VIIIs-1(15).

very fine roots; many micro and very fine interstitial pores, common micro and very fine tubular pores; violently effervescent; moderately alkaline (pH 8.0); gradual, wavy boundary.

AC--15 to 24 inches, light brownish-gray (10YR 6/2) heavy sandy loam; dark brown (10YR 4/3) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common micro and very fine roots; many micro and very fine interstitial pores, common micro and very fine tubular pores; violently effervescent; moderately alkaline (pH 8.0); abrupt, irregular boundary.

C--24 inches, tilted, bedded soft sandstone with thick lime coating on bedding planes and seams. The main body of the rock is light brownish gray (2.5Y 6/2) with white (10YR 8/2) coatings and thin veins of pink (5YR 7/4). The bedrock is soft enough to be broken by hand.

severely eroded and only 6 to 20 inches of soil remains.

Included in mapping are areas of Kettleman soil that are not so severely eroded. Other included Kettleman soils have a loam or clay loam surface texture. Also included are areas of Wasioja soils.

Permeability is moderate. Surface runoff is rapid, and the erosion hazard is high. Fertility is very low. The available water capacity is 1.0 to 3.0 inches in the 6 to 20 inches of rooting depth.

This soil is used for limited range, for wildlife habitat, and watershed. Capability unit VIIe-9(15); Arid Loamy range site.

Kettleman fine sandy loam, 30 to 75 percent slopes (KtG). This soil has a profile similar to the one described as representative for the series except that as much as 20 percent of the surface area is covered with gravel and cobbles. The soil is deeply dissected by drainageways. Depth to rock is 18 to 24 inches.

a depth of 20 to 60 inches. These soils are on rounded hills in areas scattered throughout the western part of the survey area. Slopes are 9 to 75 percent. The vegetation is annual grasses and forbs and includes burclover. A few areas are covered with a dense growth of mustard. Elevations range from 200 to 2,000 feet. The average annual rainfall is 12 to 18 inches, the average annual air temperature is about 59° F., and the frost-free season is 210 to 300 days. Linne soils are associated with Diablo soils.

In a representative profile, the surface layer is very dark gray, dark-gray, and gray, calcareous clay loam about 32 inches thick that is underlain by white, calcareous, fine sandy loam. At a depth of about 56 inches is soft, marly mudstone.

Linne soils are used for range and for dryland grain.

Representative profile of the Linne series (approximately 11 miles southeast of Santa Maria, latitude 34 degrees 48' 62" north, longitude 120 degrees 21' 06" west):

distinct lime filaments; moderately alkaline (pH 8.0); clear, irregular boundary.

C1ca--32 to 36 inches, white (N 8 and 10) fine sandy loam, very pale brown and white (10YR 7/2 and 8/2) when moist; massive; extremely hard, firm, sticky and plastic; no roots; common very fine interstitial pores and few very fine tubular pores; this horizon is somewhat discontinuous and variable in thickness, and is broken by squirrel holes; violently effervescent; moderately alkaline (pH 8.0); clear, irregular boundary.

C2--36 to 51 inches, white (N 8) mudstone, wetting to very fine sandy loam, light gray and pale yellow (2.5Y 7/2 and 8/4) when moist; massive; strongly effervescent; moderately alkaline (pH 8.0).

Color of the A horizon ranges from very dark gray to dark gray. The texture of the A horizon ranges from clay loam to silty clay loam. Depth to bedrock ranges from 20 inches to 60 inches or more.

pability unit IVe-1(15); Clayey range site.

Linne clay loam, 30 to 45 percent slopes (LcF).--This steep soil is on smooth, rolling hills. Depth to bedrock ranges from 20 inches on ridgetops to 40 inches near the lower part of slopes.

Included in mapping is an unnamed silty clay soil that is otherwise very similar to the Linne soils. Also included are small areas, mainly on ridgetops, of a gray, calcareous clay loam soil that is less than 20 inches deep. Areas of Landslides are also included.

Permeability is moderately slow. Surface runoff is rapid, and the erosion hazard is high. Fertility is high. The available water capacity is 3.0 to 7.0 inches in the 20 to 40 inches of rooting depth.

This soil is used for range, wildlife habitat, and watershed. Capability unit VIe-1(15); Clayey range site.

Linne clay loam, 45 to 75 percent slopes (LcG).--This soil is about 20 to 30 inches deep over bedrock. Slopes are about 50 percent and normally do not exceed 60 percent.

when moist; strong, very fine and medium, granular structure; hard, very friable, slightly sticky and slightly plastic; many micro and very fine roots; many micro and very fine interstitial pores; slightly acid (pH 6.5); abrupt, smooth boundary.

A12--1 1/2 to 6 inches, dark grayish-brown (10YR 4/2) heavy loam, very dark grayish brown (10YR 3/2) when moist; weak, fine and medium, sub angular blocky structure; very hard, very friable, slightly sticky and slightly plastic; common micro and very fine roots; common micro and very fine interstitial pores and many micro and very fine tubular pores; slightly acid (pH 6.5); abrupt, wavy boundary.

A13--6 to 11 inches, dark grayish brown (10YR 4/2) heavy loam, very dark grayish brown (10YR 3/2) when moist; strong, fine and medium, granular structure; hard, very friable, slightly sticky and slightly plastic; common micro and very fine roots; many micro and very fine interstitial pores; slightly acid (pH 6.5); abrupt, wavy boundary.

forbs. Elevations range from 200 to 3,000 feet. The average annual rainfall is 12 to 25 inches, the average annual air temperature is about 58° F., and the frost free season is about 210 to 300 days. Lopez soils are associated with Santa Lucia and Crow Hill soils.

In a representative profile, the surface layer is dark-gray shaly clay loam, about 8 inches thick, over gray very shaly clay loam. At a depth of about 14 inches is hard, fractured Monterey Shale. In some areas the texture of the surface layer is loam, and about 2 to 10 percent of the surface is covered with shale outcrops.

Lopez soils are used for very limited range, for wildlife, and for watershed.

Representative profile of the Lopez series (2 miles south from the summit of Tepusquet and Buckhorn Divide on Tepusquet Road, about 30 feet west from edge of road on hillside):

A11- 0 to 8 inches, dark-gray (10YR 4/1) shaly clay loam, very dark gray (10YR 3/1) when moist; about 15 percent, by volume, is angular shale

Lopez rocky loam, 75 to 100 percent slopes (LkG).--This extremely steep soil is on mountainous uplands. The surface layer is loam, and about 2 to 10 percent of the surface is shale outcrops. Otherwise the profile is similar to the one described as representative for the series. The soil contains large amounts of flat, angular, flaggy shale fragments that range in size from coarse sand to about 10 inches across. Depth to rock ranges from 8 to 12 inches.

Included in mapping are areas where the soil is less than 8 inches thick over the rock. Also included are small areas of soil that is similar to Lopez soils except that it is calcareous throughout the profile.

This excessively drained soil is moderately permeable. Surface runoff is very rapid, and the erosion hazard is very high. Fertility is low. The available water capacity is 1 inch to 2 inches in the 8 to 12 inches of rooting depth.

This soil is used as watershed and for wildlife. Capability unit VIIIs 1(15).

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average annual air temperature is 59° F., and the frost-free season is about 240 to 320 days. Los Osos soils are associated with San Benito and Lodo soils.

In a representative profile, the surface layer is mostly dark grayish-brown clay loam about 12 inches thick. The subsoil is dark grayish-brown heavy clay loam, dark yellowish-brown clay, and yellowish-brown very stony clay loam. This layer extends to a depth of about 25 inches, where it is underlain by highly fractured shale. Most of the Los Osos soils in this Area are mapped as a complex with the San Benito soils.

Los Osos soils are used chiefly for range. Small areas are used for dryfarmed hay and grain.

Representative profile of the Los Osos series (about 50 yards north of first cattle guard at top of hill on Point Sal Road, about 4 miles southwest of Guadalupe):

A11--0 to 1 inch, dark grayish-brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) when moist; wind-deposited material from nearby grained, highly fractured shale; rock fragments coated with very dark gray (10YR 3/1) clay films.

Typically, the A horizon ranges from dark brown to dark grayish brown in color. This horizon is dominantly light clay loam in texture, but it ranges from loam to clay loam. The B2t horizons are heavy clay loam to clay. Reaction generally is slightly acid to medium acid in the A horizon and is slightly acid to mildly alkaline in the B2t horizons. The parent bedrock is slightly firm sandstone or hard, metamorphosed shale. The depth to bedrock ranges from about 40 inches in the less sloping areas to about 20 inches in the steeper areas.

Los Osos clay loam, 15 to 30 percent slopes (LoE).--This hilly soil has the profile described as representative for the series. Bedrock is at a depth of 24 to 30 inches.

Included in mapping are small areas of Gaviota, Diablo, and San Benito soils. Also included are small gullied areas.

ly slow. The available water capacity is 6 to 8 inches in the 36 to 48 inches of rooting depth.

These soils are used chiefly for range. Small areas are used for dryfarmed grain and hay. Capability unit IVe-3(15); Clayey range site.

Los Osos-San Benito clay loams, 30 to 45 percent slopes (LsF).--These steep soils are in the hills. Nearly 70 percent of the mapping unit is Los Osos clay loam, and nearly 30 percent is San Benito clay loam. Small areas of Landslides and of Diablo and Gaviota soils are included in mapping.

Each of the major soils has a profile similar to the one described as representative for its series. On both soils, surface runoff is rapid, and the hazard of erosion is high. Their fertility is moderate.

Permeability in the Los Osos soil is slow. The available water capacity is 3 to 6 inches in the 20 to 36 inches of rooting depth.

In the San Benito soil, permeability is moderately slow. The available water capacity is 5 to 7 inches in the 34 to 40 inches of rooting depth.

57° F., and the frost-free season is 300 to 320 days. Marina soils are associated with Oceano soils.

In a representative profile, the surface layer is grayish-brown and brown sand and light loamy sand about 27 inches thick. The subsoil, about 23 inches thick, is light-brown loamy sand and contains thin clay bands. The substratum is light-brown and pink sand extending to a depth of 60 inches and deeper.

Marina soils are used for a variety of irrigated crops, such as strawberries and alfalfa, and for range.

Representative profile of the Marina series (about 7 miles southeast of Santa Maria, NW1/4 of SW1/4 sec. 7, T. 9 N., R. 33 W.):

Ap1--0 to 7 inches, grayish-brown (10YR 5/2) sand, dark brown (10YR 4/3) when moist; weak, fine and medium, granular structure; soft, very friable, nonsticky and nonplastic; many very fine and few fine roots; many very fine interstitial pores and few fine tubular pores; slightly acid (pH 6.5) (low acidity may be

soft, loose, nonsticky and nonplastic; very few very fine roots; many very fine interstitial pores; several bands 1/4 to 3/4 inch thick, brown (7.5YR 4/3d); bands hard and friable; medium acid (pH 6.0); gradual, wavy boundary.

C2--61 to 72 inches, pink (7.5YR 7/4) sand, reddish yellow (7.5YR 6/6) when moist; single grain; soft, loose, nonsticky and nonplastic; many very fine interstitial pores; weak continuous bands 1 inch to 1 1/2 inches thick on about 3-inch centers; medium acid (pH 6.0).

The A horizon ranges from brown and grayish brown, to pale brown in color and from sand to loamy sand in texture. Soil reaction ranges from strongly acid to slightly acid. In the B and C horizons, in some areas, are distinct, wavy, yellowish-red bands that are irregular and discontinuous. These bands are light sandy loam in texture and contain clay bridges. In some places, in the nonbanded part of the B horizon, there are a few thin clay films on fracture planes and in pores.

moderate to high. The hazard of soil blowing is high. Fertility is very low. The available water capacity is 3 to 4 inches, and the effective rooting depth is more than 60 inches.

This soil is used for range. Capability unit VIIe-4(15); Sandy range site.

Marina sand, 9 to 30 percent slopes, severely eroded (MaE3).--Areas of this soil generally are small and scattered and are limited in extent. Deep gullies are numerous, and most areas are severely rilled.

Included in mapping are areas of Oceano soils and small areas of Marina soils that are less eroded.

This soil is moderately permeable. Surface runoff is rapid, and the hazard of erosion by water is high. The hazard of soil blowing is also high. Fertility is very low. The available water capacity is 3 to 4 inches in the 60-inch rooting zone.

Range is the primary use for this soil. Capability unit VIIe 4(15); Eroded or Shallow Sandy range site.

temperature is about 57° F., and the frost-free season is about 200 to 300 days. Maymen soils are associated with Gaviota soils.

In a representative profile, the surface layer is brown and dark-brown stony loam and gravelly loam about 7 inches thick. The subsoil is pale-brown gravelly heavy clay loam. At a depth of about 10 inches is shattered shale.

Maymen soils are used for wildlife and watershed.

Representative profile of the Maymen series (about 1.5 miles south of Lake Cachuma and 2 miles southeast of Camp Drake, SW1/4 of SE1/4 sec. 4, T. 5 N., R. 29 W.):

O1--1/2 inch to 0, fresh oak leaves, twigs and charcoal.

A11--0 to 3 inches, dark-brown (10YR 3/3) stony light loam, very dark brown (10YR 2/2) when moist; moderate, fine and medium, granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine interstitial pores and few very fine tubular pores; medium acid (pH 6.0); gradual, smooth boundary.

Permeability is moderate, surface runoff is very rapid, and the erosion hazard is very high. Fertility is very low. The available water capacity is 1 inch to 3 inches in the 10- to 20-inch root zone.

This soil is used for wildlife and as watershed. Capability unit VIIIs-1(15).

Metz Series

The Metz series consists of somewhat excessively drained loamy sands that are underlain by coarse, stratified, calcareous sediments. These soils are on low flood plains along major streams and on coarse, recently deposited alluvial fans in the Santa Maria, Cuyama, and Lompoc Valleys and to a minor extent in the San Antonio Valley. Slopes are 0 to 9 percent. The vegetation is annual grasses, forbs, and scattered sagebrush. Elevations range from 25 to 2,500 feet. The average annual rainfall is 12 to 18 inches, the average annual air temperature is about 59° F., and the frost-free period is about 180 to 340 days. Metz soils are associated with Mocho soils.

(pH 8.0); clear, wavy boundary.

C2--32 to 51 inches, pale-brown (10YR 6/3) light loamy sand, dark yellowish brown (10YR 4/4) when moist; massive; soft, very friable, nonsticky and nonplastic; few micro and coarse roots; common micro and medium tubular pores and many very fine interstitial pores; slightly effervescent; moderately alkaline (pH 8.0); gradual, wavy boundary.

C3--51 to 72 inches, light yellowish brown (10YR 6/4) loamy coarse sand, yellowish brown (10YR 5/4) when moist; massive; soft, very friable, nonsticky and nonplastic; very few micro and medium roots; very few medium tubular pores and many very fine interstitial pores; slightly effervescent; moderately alkaline (pH 8.0). The C3 horizon contains discontinuous bands, 1/4 inch to 1 1/2 inches thick, that are silty clay loam in texture, dark brown (10YR 4/3) when moist, and strongly effervescent.

The main variations in the Metz soils are the result of stratification. Texture of the A horizon ranges from loamy coarse sand to loamy fine sand.

cept that it contains more coarse sand throughout the profile. The soil is subject to occasional flooding.

Included in mapping are areas of Sandy Alluvial Land.

Permeability is rapid. Surface runoff is slow, and the erosion hazard is slight. Fertility is low. The available water capacity is 4 to 5 inches in the 60-inch rooting zone.

Because the areas of this soil are small and irregular in shape, they are used mainly for range. Selected areas are used for irrigated vegetables and field crops. Capability unit IIIs-4(14); Sandy range site.

Metz loamy sand, 2 to 9 percent slopes, eroded (MnC2).--This soil is gently sloping and sloping and occurs on alluvial fans in the Cuyama Valley. It is subject to frequent flooding during the rainy season. This soil has a profile similar to the one described as representative for the series except that it contains more coarse sand. In most areas the surface is raw and uneven and is dissected by numerous shallow channels.

Mine Pits and Dumps

Mine pits and dumps (MpG) consists of pits from which raw diatomaceous earth is taken in mining and areas where the waste materials from these pits is dumped. Most mining for diatomaceous earth is in the Santa Ynez Mountains near Lompoc. Diatomaceous earth deposits occupy large areas and are several hundred feet thick. They are made up of nearly pure, siliceous, skeletal deposits from microscopic algae.

Also in this unit are smaller areas of flagstone rock quarries, chiefly in the Tepusquet area, and a few rock quarries for road building and other construction.

This land type has no value for farming but has value as a source of raw material. Capability unit VIIIs-1(15).

Mocho Series

The Mocho series consists of well-drained silty clay loams developed from recently deposited alluvium. These soils occur on alluvial fans and on

A1--13 to 26 inches, grayish-brown (2.5Y 5/2) light silty clay loam, dark grayish brown (10YR 4/2) when moist; massive; hard, friable, sticky and plastic; few micro roots; common very fine and medium tubular pores and many micro interstitial pores; strongly effervescent; disseminated lime; moderately alkaline (pH 8.2); gradual, wavy boundary.

C1--26 to 41 inches, grayish-brown (2.5Y 5/2) light silty clay loam, dark brown (10YR 4/3) when moist; massive; hard, sticky and plastic; few micro roots; common very fine and medium tubular pores and many micro interstitial pores; strongly effervescent; disseminated lime and lime in fine irregular soft masses; moderately alkaline (pH 8.2); gradual, smooth boundary.

C2--41 to 67 inches, grayish-brown (2.5Y 5/2) silty clay loam, dark brown (10YR 4/3) when moist; massive; hard, friable, sticky and plastic; very few micro roots; many very fine tubular pores and common micro interstitial pores; strongly effervescent; disseminated lime and lime in fine irregular soft masses; moderately alkaline (pH 8.2); gradual, smooth boundary.

to 60 inches thick, overlying sand and gravel. Because the substratum consists of sand and gravel, the water-holding capacity of this soil is less than that of other Mocho soils.

Included in mapping are small areas where the sand and gravel substratum is 20 to 30 inches below the surface. Also included are small areas of Metz and Sorrento soils.

Permeability is moderately rapid above the substratum and very rapid in the substratum. Surface runoff is very slow, and the erosion hazard is none to slight. Fertility is moderate. The available water capacity is 5 to 7 inches in the 60-inch root zone.

This soil is used for a variety of lime-tolerant vegetables and field crops. Capability unit IIs-0 (14).

Mocho sandy loam, sandy substratum, overflow (Mt).--This nearly level soil occupies flood plains adjacent to major streams and channels. It is flooded occasionally during heavy storms and is

Mocho loam (Mv).--This soil is nearly level and occurs on flood plains in the Santa Maria and Lompoc Valleys. It is not subject to flooding. This soil has a profile similar to the one described as representative for the series except that the texture is loam throughout.

Included in mapping are areas of Sorrento soils. Some other soils in the Mocho series are also included.

Permeability is moderate. Surface runoff is very slow, and the erosion hazard is none to slight. Fertility is high. The available water capacity is 9 to 11 inches in the 60-inch root zone.

This soil is used for all lime-tolerant crops grown in the survey area. Capability unit I-1(14).

Mocho loam, overflow (Mw).--This soil has a profile similar to the one described as representative for the series except that the profile is stratified

1,500 feet. Elevations range from 150 to 2,500 feet. The average annual rainfall is 12 to 25 inches, the average air temperature is 57° F., and the frost-free season is 200 to 300 days. Montara soils are associated with Climara soils.

In a representative profile, the surface layer is very dark grayish brown, gravelly clay loam, about 13 inches thick, underlain by pale-olive and olive, fractured serpentine rock. Rock outcrops occupy 2 to 10 percent of the surface area.

Montara soils are used for range, wildlife habitat, and watershed.

Representative profile of the Montara series (on Figueroa Mountain Road, 1.4 miles east from bridge crossing of Birbent Creek, near Los Padres National Forest boundary):

O1--1 inch to 0, litter of partially decomposed coulter pine needles, grass, and twigs.

A11--0 to 3 inches, very dark grayish brown (10YR 3/2) clay loam, very dark brown (10YR 2/2) when moist; moderate, fine, granular structure; slightly hard, friable, sticky and plastic; many very fine, fine, medium, and coarse roots; mixing zone. Fertility is low.

This soil is used for range, wildlife, and watershed. Capability unit VIIe-9(15); Shallow Loamy range site.

Narlon Series

The Narlon series consists of moderately well drained soils that have a loamy sand surface layer and a clay subsoil. These soils are underlain by old marine deposits. They are on moderately dissected terraces. Slopes range from 0 to 15 percent. The vegetation is annual grasses, forbs, and low chaparral. Elevations range from 200 to 800 feet. The average annual rainfall is 14 to 17 inches, the average annual air temperature is about 55° F., and the frost-free season is about 300 to 320 days. Narlon soils are associated with Tangair soils.

In a representative profile, the surface and subsurface layers are light brownish-gray, pale-brown, and light-gray loamy sand about 32 inches thick. The subsoil is gray and olive-gray clay and sandy clay that extends to a depth of more than 60 inches.

many very fine interstitial pores and few very fine tubular pores; strongly acid (pH 5.5); clear, wavy boundary.

AB--32 to 35 inches, 40 percent of soil mass is brown (10YR 4/3m) sandy clay loam that has continuous, moderately thick clay films in bridges; has relic-rounded column tops and irregular lumps of degrading material from B2 horizon 1/4 inch to 2 inches in diameter; remaining 60 percent of soil mass is light-gray to white (10YR 7/2), 8/1d) loamy sand that has weak, skeletal column tops and very few thin clay bridges in some places.

B21t--35 to 50 inches, gray (5Y 5/1) clay, dark gray (5Y 4/1) with dark reddish-brown to strong-brown and light olive-brown (2.5YR 3/4, 3/6, 7.5YR 5/6, 2.5Y 5/4) mottles when moist, dark yellowish brown (10YR 4/4) mixed when rubbed; many, medium, prominent, yellowish red to reddish-yellow (5YR 5/6, 3/6, 4/4, and 7.5YR 6/6) mottles; moderate, coarse, columnar structure; very hard, extremely firm, very

Narlon sand, 0 to 5 percent slopes (NrB).--This soil is nearly level and gently sloping and occurs on terraces. It has a profile similar to the one described as representative for the series except that it has a sand surface layer 20 to 40 inches thick. The relief is known locally as mild "hog wallow."

Included in mapping are small areas of soils that have a loamy sand surface layer. Areas of Tangair soils and Narlon soils, hardpan variant, are also included.

Permeability is very slow. A perched water table often forms above the clay subsoil after rains or irrigation. Surface runoff is slow, and the hazard of erosion by water is none to slight. The hazard of soil blowing is moderate to high. Fertility is very low. The available water capacity is 2 to 4 inches in the 20 to 40-inch root zone. A small amount of water in the clay subsoil is available very slowly for use by plants.

This soil is used mainly for military purposes and for range and watershed. Capability unit VIe-4 (15); Sandy range site.

dissected, rolling terraces that are not eroded. Slopes average 12 percent.

Included in mapping are small areas of soils where the surface layer is sand or sandy loam. Also included are areas of Oceano and Tangair soils and areas of sand dunes.

Permeability is very slow. A perched water table sometimes forms above the clay subsoil after a rain. Surface runoff is medium, and the erosion hazard is moderate to high. Fertility is very low. The available water capacity is 2 to 4 inches in the 20- to 40-inch rooting zone. Some water in the clay subsoil is available very slowly for use by plants.

This Narlon soil is used mainly for military purposes and for range. Capability unit VIIe-4(15); Sandy range site.

Narlon Series, Hardpan Variant

The Narlon series, hardpan variant, consists of moderately well drained soils that formed on wind-modified, sandy, old marine terrace deposits. These soils are on terraces, most extensively in Vandenberg

similar to those in the Ap horizon but slightly more numerous and larger; medium acid (pH 6.0); gradual, irregular boundary.

A2--14 to 26 inches, pink (7.5YR 7/4) sand, brown (7.5YR 5/4) when moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots and fine and common medium roots; many very fine interstitial pores and many very fine, fine and medium tubular pores; soil mass is 1 to 2 percent concretions similar to those in the Ap horizon except that they are 1/4 inch to 1 1/2 inches across; medium acid (pH 6.0); abrupt, wavy boundary.

B21t--26 to 30 inches, prominently mottled and mixed dark-brown to yellowish-brown (10YR 4/4, 4/3, 3/3, 5/4) light sandy clay, with seams of light gray (10YR 7/2, 7/3), very dark grayish brown to dark yellowish brown (10YR 3/3, 3/2, 4/4) when moist; strong, medium and coarse, columnar structure; very hard, firm, sticky and plastic; few very fine, fine, and medium roots; many micro and very fine interstitial pores and many very fine tubular pores; common moderately thick and thick clay films lining

moist; massive; hard, firm, brittle, nonsticky and nonplastic; no roots; many very fine interstitial pores; many thin clay bridges between mineral grains, common moderately thick clay films filling old tubular pores; weakly cemented; strongly acid (pH 5.5).

In this profile, roots are concentrated in the top 2 inches of the Ap horizon. In the B21 and B22 horizons, almost all the roots are in the vertical cracks and very few are within the peds.

The Ap and A1 horizons range from light brownish gray and grayish brown to brown and light brown in color. The A2 horizon ranges from very pale brown and light yellowish brown to pink. Normally, a thin, light-gray layer lies directly on top of the B2t horizon. Texture of the Ap, A1, and A2 horizons is chiefly sand to loamy sand. These horizons contain small, very dark, manganese concretions, ranging from very few in number to 2 percent of the soil mass. Thickness of the A2 horizon varies. In most places, the top of the B horizon appears to be degrading and is mixed with the A2 horizon. The boundary between them is indistinct in some places.

soils where the surface layer is 10 to 20 inches thick are also included. Other included small areas consist of Narlon and Tangair soils.

Permeability is very slow. A perched water table sometimes forms above the sandy clay subsoil after a rain or after irrigation. Surface runoff is medium, and the hazard of erosion by water is moderate. The hazard of soil blowing is high. Fertility is very low. The available water capacity is 2 to 3 inches in the 20- to 30-inch root zone. Some water is available very slowly from the sandy clay subsoil for use by plants.

This soil is used for range and for nonfarm purposes, such as military bases and homesites. Capability units IVe-4(14) and VIe-4(15); Sandy range site.

Oceano Series

The Oceano series consists of excessively drained sandy soils that formed in old coastal sand dunes. These soils are on coastal plains in scattered areas, between the Santa Maria River and Point

strongly acid (pH 5.5); gradual, smooth boundary.

AC--15 to 20 inches, light brownish-gray (10YR 6/2) sand, brown (10YR 4/3) when moist; massive; soft, very friable, nonsticky and nonplastic; very few very fine roots; many very fine interstitial pores and very few fine tubular pores; strongly acid (pH 5.3); gradual, smooth boundary.

C1--20 to 39 inches, pale-brown (10YR 6/3) sand, yellowish brown (10YR 5/4) when moist; massive; soft, very friable, nonsticky and non plastic; very few very fine roots; many very fine interstitial pores and very few fine tubular pores; very strongly acid (pH 5.0); gradual, smooth boundary.

C2--39 to 55 inches, pale-brown (10YR 6/3) sand, yellowish brown (10YR 5/4) when moist; massive; soft, very friable, nonsticky and nonplastic; very few micro roots; many very fine interstitial pores; several weak Liesegang bands 1/8 inch thick (7.5YR 4/4m, 5/4d), slightly hard, somewhat branched, upper band bends up into C1 horizon; slightly more firm

is 2 to 4 inches in the 60-inch effective root zone.

This soil is used for irrigated walnuts, alfalfa, and strawberries and for range. Capability units IVe-4(14) and VIe-4(15); Sandy range site.

Oceano sand, 2 to 15 percent slopes (OcD).--This soil is gently sloping to strongly sloping. It occurs on terracelike sites in widely scattered areas within 20 miles of the coast. This soil has the profile described as representative for the series.

Included in mapping are small areas of Marina sand in swales and small areas that have shallow gullies. Also included are small areas of Dune land.

Permeability is rapid. Surface runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is very high. Fertility is very low. The available water capacity is 2 to 4 inches in the 60-inch rooting zone.

This soil is used to a limited extent for irrigated alfalfa and walnuts and for range (pl. V, top). Capability units IVe 4(14) and VIe-4(15); Sandy range site.

crops.

Representative profile of the Panoche series (2.3 miles east of New Cuyama on Highway 166 to Bell Road, about 1/2 mile south on Bell Road, 1/8 mile east on farm road, and 50 feet north in field):

Ap--0 to 13 inches, pale-brown (10YR 6/3) loam, dark brown (10YR 4/3) when moist; moderate, medium and coarse, granular structure; hard, very friable, sticky and slightly plastic; many micro and very fine roots; many very fine and fine interstitial pores; strongly effervescent; disseminated lime; moderately alkaline (pH 8.0); abrupt, smooth boundary.

C1--13 to 15 inches, pale-brown (10YR 6/3) sandy loam, dark brown (10YR 4/3) when moist; massive; hard, very friable, slightly sticky and slightly plastic; common micro and very fine roots; many micro interstitial pores and many micro and very fine tubular pores; violently effervescent; disseminated lime and few fine lime nodules and filaments; moderately alkaline (pH 8.0); abrupt, smooth boundary.

sand that is about 1 inch thick, or too thin to sample. Other strata too thin to sample occur throughout the profile.

In the Panoche series, the color of the A horizon ranges narrowly from light grayish brown to pale brown. Texture of the A horizon ranges from sandy loam to loam. The C horizons vary widely within the profile and from place to place. The texture ranges from loamy fine sand to silty clay loam. The soil is calcareous throughout; however, in some places it is noncalcareous in the surface layer and strongly calcareous below a depth of 10 inches.

Panoche sandy loam, 0 to 2 percent slopes (PcA).--This soil occurs on broad, nearly level fans and flood plains in Cuyama Valley mainly east of New Cuyama. It has a profile similar to the one described as typical for the series except that the surface layer is sandy loam. The soil is highly stratified.

Included in mapping are areas of Panoche loam and of Metz soils.

Permeability is moderately rapid. Surface runoff is very slow, except that overflow water from the surrounding hills runs rapidly onto the soil. The erosion hazard is moderate. Fertility is high. The available water capacity is 6.0 to 7.5 inches in the 60-inch effective rooting zone.

This soil is used mainly for alfalfa; some areas are planted to sugar beets, potatoes, and silage corn. Capability unit IIw-1(17).

Panoche sandy loam, overflow, 2 to 5 percent slopes (PdB).--This gently sloping soil occurs near the mouths of side drainageways and extends well into the foothills in small narrow valleys. It has a profile similar to the one described as typical for the series except that the texture is dominantly sandy loam throughout the profile. Water from the surrounding hills and mountains flows across this soil during infrequent periods of high rainfall.

Included in mapping are some small areas dissected by channels. Also included are areas of Metz soils and of Sandy alluvial land.

This Panoche soil is used for range. Where water is available, this soil is used for irrigated alfalfa and sugar beets. Capability unit IIe-1(17); Arid Loamy range site.

Panoche loam, overflow, 0 to 2 percent slopes (PfA).--This soil occurs near the outlets of drainageways. It has a profile similar to the one described as typical for the series except that it is less stratified and the loam texture is more uniform throughout the profile. During periods of intense rainfall, floodwater flows across this soil and fresh deposits of material are laid down and removed. This damages crops.

Included in mapping are areas of Panoche sandy loam, overflow. Areas of Metz soils and Sandy alluvial land are also included.

Permeability is moderate. Surface runoff is slow, except for the water that runs in from adjacent, more sloping soils. The erosion hazard is moderate. Fertility is high. The available water capacity is 9 to 11 inches in the 60-inch root zone.

terrace):

A11--0 to 2 inches, brown (10YR 5/3) heavy sandy loam, dark brown (10YR 3/3) when moist; moderate, thin and medium, platy structure; hard, very friable, slightly sticky and slightly plastic; many very fine roots; few very fine tubular pores and common very fine interstitial pores; neutral (pH 6.7); abrupt, smooth boundary.

A12--2 to 15 inches, brown (10YR 5/3) heavy sandy loam, dark brown (10YR 3/3) when moist; massive; hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine and fine tubular pores and many very fine interstitial pores; neutral (pH 7.0); gradual, irregular boundary.

A13--15 to 32 inches, brown (10YR 5/3) heavy sandy loam, dark brown (10YR 3/3) when moist; massive; hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine and fine tubular pores and many

Pleasanton sandy loam, 0 to 2 percent slopes (PnA).--This soil is nearly level and occurs on terraces. The surface layer averages about 30 inches thick. As much as 10 percent of the surface layer is gravel or cobblestones.

Included in mapping are areas of Botella and Garey soils. Also included are small areas of Pleasanton cobbly sandy loam and Pleasanton gravelly very fine sandy loam.

Permeability is moderately slow. Surface runoff is slow, and the erosion hazard is slight. Fertility is moderate. The available water capacity is 7.5 to 8.5 inches in the 60-inch effective rooting depth.

This soil is used for some irrigated row and field crops, and for dryland hay and grain. Capability unit I-1(14).

Pleasanton sandy loam, 2 to 9 percent slopes (PnC).--This soil is gently sloping to moderately sloping and occurs on terraces. It has the profile described as representative for the series. As much

quartzite, and granitic rocks. Thickness of the surface layer is about 20 inches.

Included in mapping are some severely eroded areas where the subsoil is exposed. Other included soils are 35 to 60 percent cobbles and gravel throughout the profile.

Permeability is moderately slow. Surface runoff is medium to rapid, and the erosion hazard is moderate to high. Fertility is low. Because of the gravel and cobblestones, the available water capacity is only 5 to 6 inches. The effective rooting depth is more than 60 inches.

This soil is used mainly for range. It is also used for watershed and wildlife. Capability unit VIe-1(15); Loamy range site.

Pleasanton very fine sandy loam, 0 to 2 percent slopes (PrA).--This soil is nearly level and occurs on low terraces on both sides of the Santa Maria Valley. This soil has a profile similar to the one described as representative for the series except that the surface layer tends toward grayish brown sandy loam. Also included are small areas of a very gravelly Pleasanton soil.

Permeability is moderately slow. Surface runoff is slow to medium, and the erosion hazard is slight to moderate. Because of the gravel in the surface layer, the available water capacity is only 6 to 7 inches. Fertility is moderate.

This Pleasanton soil is used mainly for range; small areas are used for dryland hay and grain and for sugar beets. Capability unit IVe-1(15); Loamy range site.

Positas Series

The Positas series consists of well-drained fine sandy loams that have a clay subsoil. These soils are in the upper Santa Ynez Valley on smooth, bench-like terraces that are broken by narrow, steep-sided drainageways. Slopes are 2 to 30 percent. The vegetation is annual grasses, forbs, and scattered oak trees. Elevations range from 400 to 900

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and few fine and medium tubular pores; few thin clay films in interstitial pores; medium acid (pH 6.0); abrupt, smooth boundary.

B21t--21 to 26 inches, reddish-brown (5YR 4/4) clay, dark reddish brown (5YR 3/3) when moist; moderate, coarse, prismatic structure; very hard, extremely firm, very sticky and very plastic; few micro roots; very few very fine interstitial pores and very few very fine tubular pores; many thin clay films on ped faces, continuous moderately thick clay films in the tubular and interstitial pores; common, thin, prominent black stains on mineral grains and ped faces; neutral (pH 7.0); gradual, irregular boundary.

B22t--26 to 42 inches, reddish-brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) when moist; reddish brown (5YR 4/4) clay films on peds, dark-brown (7.5YR 3/4, 4/4, 10YR 4/3) blotches; weak, coarse, prismatic structure; very hard, extremely firm, very sticky and very plastic; very few micro roots; very few very fine interstitial pores; continuous thin clay films on ped faces and mineral grains, common thick

slow to medium, and the erosion hazard is slight to moderate. Fertility is low. The available water capacity is 4 to 5 inches in the 20- to 26-inch root zone. Very little moisture is available from the clay subsoil, and this small amount is available very slowly.

This soil is used for irrigated sugar beets for dryland grain, and for range. Capability units IIIe-3(14) and IVe-3(15); Claypan range site.

Positas fine sandy loam, 9 to 15 percent slopes (PtD).--This strongly sloping soil is on dissected terraces. The surface layer is about 12 to 20 inches thick.

Included in mapping are some severely eroded areas and areas that have a loam surface layer.

Permeability is very slow. Surface runoff is medium, and the erosion hazard is moderate. Fertility is low. The available water capacity is 2 to 3 inches in the 12- to 20-inch root zone. Very little moisture is available from the clay subsoil, and this small amount is available slowly.

This soil is used for range. Capability unit VIe-3(15); Claypan range site.

Positas cobbly fine sandy loam, 2 to 15 percent slopes (PuD).--This gently sloping to strongly sloping soil occurs on old alluvial fans on the south side of the Santa Ynez River in the vicinity of Lake Cachuma. These fans are at the mouths of drainageways that originate in the Santa Ynez Mountains. This soil has a profile similar to the one described as representative for the series except that 20 to 35 percent of the entire soil profile is well-rounded sandstone cobblestones and boulders. The surface layer is 10 to 20 inches thick.

Included in mapping are fairly large areas in which 35 to 60 percent of the soil profile is cobblestones and boulders.

Permeability is very slow. Surface runoff is medium, and the erosion hazard is moderate. Fertility is very low. The available water capacity is 1 to 2 inches in the 10- to 20-inch root zone. Very little moisture is available from the clay subsoil.

This soil is used for limited range. Capability unit VIe-3(15); Claypan range site.

The Salinas series consists of well-drained silty clay loams that formed on alluvial fans and flood plains. These soils are in scattered areas in the Santa Ynez, Santa Maria, and Los Alamos Valleys. Slopes are 0 to 15 percent. The vegetation is grasses, forbs, and scattered oak trees. Elevations range from 50 to 1,000 feet. The average annual rainfall is 10 to 15 inches, the average air temperature is about 58° F., and the frost-free season is 230 to 300 days. Salinas soils are associated with Agueda soils.

In a representative profile, the surface layer is dark-gray silty clay loam about 26 inches thick. The subsoil is gray silty clay loam about 15 inches thick, and is underlain by light brownish-gray silty clay loam that extends to a depth of more than 60 inches. In some areas the texture of the surface layer is loam.

Where water is available, the Salinas soils are used for irrigated crops. Otherwise, they are used for dryland crops. Small isolated areas are used for range.

Representative profile of the Salinas series (less than 1/2 mile south of Los Olivos, 0.3 mile

tic; few very fine roots; many very fine tubular pores and many very fine interstitial pores; very few thin clay films in pores; strongly effervescent; disseminated lime and lime in fine, irregularly shaped, soft masses; moderately alkaline (pH 8.1); gradual, wavy boundary.

C1ca- 41 to 56 inches, light brownish-gray (10YR 6/2) light silty clay loam, dark grayish brown (10YR 4/2) when moist; massive; hard, friable, sticky and plastic; few very fine roots; many very fine tubular pores and many very fine interstitial pores; violently effervescent; disseminated lime and lime in medium, irregularly shaped, soft masses; moderately alkaline (pH 8.0); abrupt, smooth boundary.

C2ca--56 to 70 inches, light brownish-gray (10YR 6/2) light silty clay loam with common, fine, faint mottles of pale brown (10YR 6/3), or grayish brown (10YR 5/2) with common, fine, faint mottles of brown (10YR 5/3) when moist; massive; hard, friable, sticky and plastic; very few very fine roots; many very fine

described as representative for the series except that the surface layer is grayish-brown loam 18 to 22 inches thick.

Included in mapping are areas dissected by meandering stream channels. Areas of Agueda soils are also included.

Permeability is moderately slow. Surface runoff is slow to medium, and the erosion hazard is slight to moderate. Fertility is high. The available water capacity is 10 to 12 inches in the 60-inch root zone.

This soil is used for irrigated alfalfa, sugar beets, and walnuts. It is also used for dryland crops and for incidental annual pasture. Capability unit IIe-1(14).

Salinas loam, overflow, 0 to 2 percent slopes (SbA).--This soil is in small valleys and on flood plains that are flooded occasionally by runoff water from steeper soils. The areas of this soil are small and irregular in shape, and are located chiefly in Los Alamos Valley and in the Santa Ynez Valley. This soil has a profile similar to the one described

in shape. In the narrow valley the soil is dissected by meandering channels.

Included in mapping are a few areas in the Lompoc Valley and along the ocean in Vandenberg Air Force Base that are finer textured and, as a result, are farmed with greater difficulty.

Permeability is moderately slow. Surface runoff is slow to medium, and the erosion hazard is slight to moderate. Fertility is very high. The available water capacity is 11 to 13 inches in the 60-inch root zone.

This soil is used for alfalfa, sugar beets, and walnuts. Because of the irregular shape and small size of the areas, the soil is difficult to irrigate. It is, therefore, used chiefly for dryland small grains and hay. Capability unit IIe-1(14).

Salinas and Sorrento loams, 9 to 15 percent slopes (SeD).--This complex is made up of many irregularly shaped tracts that are scattered widely throughout the survey area. It occurs on long narrow terrace breaks between different levels of alluvial flood plains and on small alluvial fans along minor drainageways. The alluvial fans are commonly

by soft, medium-grained, fractured sandstone.

San Andreas soils are used only for range. Numerous oil wells have been dug in scattered areas of this soil.

Representative profile of the San Andreas series (4 miles northwest from U.S. Highway No. 101 on Cat Canyon Road to the summit, 0.5 mile north on oil well road, 35 feet west of road on hillside, 125 feet south of gas meter):

A11--0 to 1 1/2 inches, grayish-brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; moderate, medium, granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine interstitial pores; neutral (pH 7.0); abrupt, smooth boundary.

A12--1 1/2 to 15 inches, brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine interstitial pores and many very fine tubular pores; medium acid (pH 6.0); clear, smooth boundary.

areas where moisture is concentrated. These soils are in such intricate patterns that mapping them separately was impractical. About 50 percent of the mapping unit is San Andreas fine sandy loam and 40 percent is Tierra sandy loam. Crow Hill and Gaviota soils make up the remaining 10 percent.

The San Andreas soil has the profile described as representative for the San Andreas series. The profile of the Tierra soil is similar to the one described as representative for the series except that this soil has a sandy loam surface layer over a clay subsoil. Where the two soils merge the profiles vary widely, particularly in the amount of clay in the subsoil. In some areas the surface layer is brown sandy loam directly overlying the sandstone, and there is no subsoil. In some small areas the soil contains lime throughout the profile. In some areas the Tierra soil has a perched seasonal water table above the clay subsoil.

The San Andreas soil is well drained and moderately permeable. Surface runoff is slow to medium, and the erosion hazard is slight to moderate. Fertility is moderate. The available water capacity is 4 to 6 inches in the 24- to 40-inch root zone.

up this complex are strongly sloping to steep and occur on uplands. They are in such intricate patterns that mapping them separately was impractical. Each soil has a profile similar to the one described as representative for its respective series, but the Tierra soil is sandy loam over a clay subsoil. These soils are severely eroded and are cut by deep gullies and rills in most areas. In some areas much of the surface layer has been removed and the subsoil is exposed. About 50 percent of the mapping unit is San Andreas fine sandy loam, and about 40 percent is Tierra sandy loam.

Included in mapping are areas of San Andreas and Tierra soils that are deeper and not so severely eroded. Also included are some areas of Crow Hill and Gaviota soils. These inclusions make up about 10 percent of the complex.

The San Andreas soil is well drained and moderately permeable. Surface runoff is rapid, and the erosion hazard is high. Fertility is low. The available water capacity is 3 to 4 inches in the 18- to 26-inch root zone.

The Tierra soil is moderately well drained and very slowly permeable. Surface runoff is very rapid,

The San Benito series consists of well-drained clay loams underlain by fractured, fine-grained shale bedrock at a depth of 20 to 48 inches. These soils are on hills and mountains where slopes range from 15 to 75 percent. The vegetation is annual grass, grass and oak trees, or a combination of grass, oak, and brush cover. Elevations range from 400 to 2,000 feet. The average annual rainfall is 12 to 18 inches, the average annual air temperature is about 59° F., and the frost-free season is 240 to 290 days. San Benito soils are associated with the Diablo and Los Osos soils. In this survey area, San Benito soils were mapped only in complexes with Los Osos or Diablo soils.

In a representative profile, the surface layer is dark-brown and brown clay loam about 26 inches thick. The underlying material is pale-brown calcareous gravelly clay loam that blends into fractured fine-grained shale at a depth of about 48 inches.

San Benito soils are used for range, wildlife, and watershed.

Representative profile of the San Benito series (on Adams Ranch, south from highway No. 166 on

weak, medium, subangular blocky structure; hard, friable, sticky and plastic; very few fine, medium, and coarse roots; few fine and very few medium pores; horizon is about 90 percent shale fragments; strongly effervescent; moderately alkaline (pH 8.2).

R--60 inches, fractured shale.

Color of the A horizon ranges from brown to dark brown. Depth to bedrock ranges from 20 to 48 inches. The texture normally is finer slightly above the bedrock than it is in the upper layers, but clay films are rarely discernible. Lime content ranges from high concentration of disseminated lime throughout the C horizon to a few lime seams and coatings on rock fragments and on peds in the lower part of the profile. In some places stones, mostly detached, cover 1 to 2 percent of the surface. In some places there are no stones.

San Benito-Diablo complex, 30 to 45 percent slopes (SgF).--These steep soils are in mountainous areas in the vicinity of Buckhorn Road. About 55 percent of the mapping unit is San Benito clay loam and 35 percent is Diablo silty clay. These soils

watershed. Capability unit VIIe-5(15); Clayey range site.

Sandy Alluvial Land

Sandy alluvial land (Sh) consists of excessively drained, coarse, stratified, river-deposited material. It occupies low, nearly level land adjacent to riverbeds. Since it is slightly higher than the river flood plains, this land type is not flooded during normal flow periods; however, it is subject to overflow during moderate and severe floods. The surface is somewhat uneven as a result of soil blowing and channelling by floodwaters. The vegetation is chiefly scattered sagebrush, small trees, and sparse annual grasses and forbs. Layers of fine sand and silt are commonly intermingled with strata of coarse sand and gravel.

This land type has limited use as range. It is generally not suitable for cultivation, although some selected areas are used for strawberries. Capability unit VIIw-4(14); Sandy Alluvial range site.

soils.

In a representative profile, very dark gray shaly clay loam and very shaly clay loam about 24 inches thick is underlain by fractured, hard, brittle, siliceous shale bedrock.

The Santa Lucia soils are used for range, wildlife, and watershed.

Representative profile of the Santa Lucia series (1.8 miles south of Guadalupe on Highway No. 1 to Point Sal Road, 3.9 miles southwest on Point Sal Road, 3.8 miles southeast on ranch road, NW1/4 NE1/4 sec. 5, T. 9 N., R. 35 W.):

A11 -0 to 8 inches, very dark gray (10YR 3/1) shaly light clay loam, black (10YR 2/1) when moist; 10 percent, by volume, is angular shale fragments larger than 3/4 inch across; about 27 percent, by volume, is shale fragments larger than 2 millimeters; coarse and medium, subangular blocky structure; on about three-fourths of the acreage mapped, the upper 3/4 to 1 inch has medium to strong, fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine

Santa Lucia shaly clay loam, 9 to 15 percent slopes (SmD).--This gently rolling soil is on hills. Some tracts occur in swalelike areas that are surrounded by steeper soils. This soil is 36 to 44 inches deep to bedrock.

Included in mapping are small areas of Crow Hill soils. Some small areas of steeper Santa Lucia soils are also included.

Permeability is moderate. Surface runoff is medium, and the erosion hazard is moderate. Fertility is moderate. The available water capacity is 4 to 6 inches in the 36- to 44-inch root zone.

This soil is used for range. Some areas, which were used for dryland grain or hay, have been returned to range. Capability unit IIIe-1(15); Loamy range site.

Santa Lucia shaly clay loam, 15 to 30 percent slopes (SmE).--This soil is rolling and occurs on hills and in small irregular areas in mountains. It has the profile described as representative for the series. Depth to bedrock is 20 to 36 inches.

Included in mapping are small areas of Crow Hill soils. Some small areas of steeper Santa Lucia soils are also included.

Permeability is moderate. Surface runoff is rapid, and the erosion hazard is high. Fertility is moderate. The available water capacity is 4 to 6 inches in the 36- to 44-inch root zone.

This soil is used for range, wildlife, and watershed. Capability unit VIe-1(15); Shallow Loamy range site.

Santa Lucia shaly clay loam, 45 to 75 percent slopes (SmG).--This very steep soil is extensive and occurs in mountainous areas. Depth to rock is 20 to 24 inches.

Included in mapping are small areas of Crow Hill and of Lopez soils. Some areas of eroded Santa Lucia soils are also included.

Permeability is moderate. Surface runoff is very rapid, and the erosion hazard is very high. Fertility is moderate. The available water capacity is 2 to 4 inches in the 20- to 24-inch root zone.

This Santa Lucia soil is used for range, wildlife, and watershed. Capability unit VIIe-1(15); Steep Loamy range site.

Santa Ynez Series

The Santa Ynez series consists of moderately well drained gravelly fine sandy loams underlain by

slightly plastic; common very fine and very few fine roots; many micro interstitial pores and common very fine and few fine tubular pores; medium acid (pH 5.8); clear, wavy boundary.

A1--14 to 22 inches, light brownish-gray (10YR 6/2) light loam, very dark grayish brown (10YR 3/2) when moist; about 1/5 of this horizon is light gray (10YR 7/2) when dry, dark grayish brown (10YR 4/2) when moist; moderate, medium, subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine and very few fine roots; many very fine interstitial pores and common very fine, fine, and medium tubular pores; medium acid (pH 6.0); light-gray part apparently is lumps of A2 horizon material; abrupt, smooth boundary.

A2--22 to 25 inches, light-gray (10YR 7/1) fine sandy loam, grayish brown (10YR 5/2) when moist; moderate, medium, subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and very few fine roots; many very common thick clay films in joints and pores; slightly acid (pH 6.2); gradual, smooth boundary.

B32t--62 to 72 inches, mixed light-gray and grayish-brown (10YR 7/2, 5/2) very gravelly clay loam, dark grayish brown and brown (10YR 4/2, 5/3) when moist; massive; very hard, friable, sticky and plastic; many very fine and fine interstitial pores; continuous thin clay films in bridges between mineral grains and common moderately thick clay films in joints; medium acid (pH 6.0).

Color of the A1 and Ap horizons ranges from gray to dark grayish brown and light brownish gray. The texture ranges from fine sandy loam to clay loam. From 5 to 30 percent of these horizons is gravel. The A2 horizon is 3 to 10 inches thick. In the Bt horizon, colors are mixed, ranging widely from dark grayish brown and dark gray to light gray and pale olive. Gravel content ranges from 15 to 55 percent in the Bt horizon. Soil reaction throughout the profile ranges from strongly acid to slightly acid.

areas are used for dryland hay. Capability unit IVe-3(15); Claypan range site.

Santa Ynez clay loam, 2 to 9 percent slopes (SoC).--This soil is gently sloping to moderately sloping and occurs on terraces. It has a profile similar to the one described as representative for the series except that this soil has a dark-gray clay loam surface layer that is 5 to 15 percent gravel. Depth to the clay subsoil is about 18 to 26 inches.

Included in mapping are small areas of Santa Ynez clay loam that are level or have slopes of less than 2 percent. This included soil is somewhat poorly drained and has a perched water table above the clay subsoil for short periods.

Permeability is very slow. Surface runoff is slow to medium, and the erosion hazard is slight to moderate. Fertility is moderate. The available water capacity is 4 to 5 inches in the 18- to 26-inch effective root zone. Some moisture is available slowly from the clay subsoil.

This soil is used for shallow-rooted irrigated and dryland crops. Capability units IIIe-3(14), IVe-3(15); Claypan range site.

Shedd Series

The Shedd series consists of well-drained silty clay loams underlain by calcareous shale bedrock at a depth of 18 to 50 inches. These soils occur on hills and mountains throughout all the survey area except the drier eastern part of the Cuyama Valley. Slopes are 15 to 75 percent. The vegetation is chiefly annual grasses and bur clover, although extensive steep and shallow areas are covered with purple sage. Elevations range from 200 to 2,500 feet. The average annual rainfall is 14 to 16 inches, the average annual air temperature is about 60° F., and the frost-free season is 180 to 290 days. Shedd soils are associated with Linne soils.

In a representative profile, light brownish-gray, pale brown, and light-gray silty clay loam overlies soft, partly consolidated, fragmented shale at a depth of about 43 inches. The soils are calcareous throughout.

Shedd soils are used mainly for range, but small areas are used for dryland hay and grain.

material varies from brittle, fractured shale to soft, semiconsolidated, marly soil material.

Since this survey was completed, the Shedd soils defined as being normally dry in all parts of the soil profile and generally receive less than 10 inches of rainfall annually. The more moist soils classified as Shedd soils in this survey will be classified as soils of the Balcom series in future surveys.

Shedd silty clay loam, 15 to 30 percent slopes (SrE).--This soil is moderately steep and occurs on smooth rolling hills. Depth to bedrock ranges from 30 to 50 inches.

Included in mapping are small areas of long, irregular, rounded ridgetops that have slopes of 9 to 15 percent. Also included are some shallower Shedd soils.

Permeability is moderate. Surface runoff is medium, and the erosion hazard is moderate. Fertility is high. The available water capacity is 6 to 10 inches in the 30- to 50-inch root zone.

This soil is used mainly for range. Very limited areas are used for dryland hay. Capability unit IVe-1(15); Clayey range site.

the parent material is exposed.

Included in mapping are some noneroded areas where the soil is more than 28 inches thick. Also included are some areas of Linne soils.

Permeability is moderate. Surface runoff is very rapid, and the erosion hazard is very high. Fertility is moderate. The available water capacity is 3 to 6 inches in the 18- to 28-inch root zone. Capability unit VIIe-1(15); Shallow Clayey range site.

Shedd Series, Diatomaceous Variant

The Shedd series, diatomaceous variant, consists of well-drained silty clay loams underlain by highly calcareous diatomaceous shale bedrock at a depth of 20 to 54 inches. These soils occur on hills and mountains in small, scattered areas in the southwestern part of the survey area, mainly in the vicinity of Lompoc. Slopes are 15 to 75 percent. The vegetation is annual grasses and forbs. Elevations range from 500 to 2,000 feet. The average annual rainfall is 13 to 17 inches, the average annual air temperature is about 57° F., and the frost-free

3/1) when moist; very weak, coarse, prismatic structure parting to weak, fine, granular and weak, medium, subangular blocky structure; slightly hard, very friable, sticky and plastic; few very fine roots, many very fine roots in rodent holes, on vertical joints, and on edge of rock fragments; many very fine interstitial pores, common very fine and few fine pores, and few medium tubular pores; moderately alkaline (pH 8.0); strongly effervescent; disseminated lime and lime in fine filaments; horizon is 20 percent rock fragments 2 to 14 inches in diameter; abrupt, irregular boundary.

R--41 inches, white, very lightweight (estimated volume weight 0.7) diatomaceous shale; strongly effervescent; many rodent holes in upper R horizon filled with strong, fine to coarse, granular material from the A1 horizon. Shale readily cut and broken by hand.

Color of the A horizon ranges from gray to light gray; texture ranges from light silty clay loam to

inches in the 30- to 45-inch effective root zone.

This soil is used for range, wildlife habitat, and watershed. Capability unit VIe-1(15); Clayey range site.

Shedd silty clay loam, diatomaceous variant, 45 to 75 percent slopes (SsG).--This soil is very steep and occurs in mountainous areas. Depth to rock ranges from 20 to 30 inches.

Included in mapping are small areas of soils that are less than 20 inches deep. Also included are small areas in which 30 to 50 percent of the entire soil profile is shale fragments. Other inclusions consist of some areas of Crow Hill and of Santa Lucia soils.

Permeability is moderate. Surface runoff is very rapid, and the erosion hazard is very high. Fertility is moderate. The available water capacity is 3.5 to 6.0 inches in the 20- to 30-inch root zone.

This soil is used for range, wildlife habitat, and watershed. Capability unit VIIe-1(15); Clayey range site.

moist; moderate, medium and coarse, subangular blocky structure; hard, friable, sticky and slightly plastic; common very fine roots; many very fine, fine, and medium tubular pores and many very fine interstitial pores; moderately alkaline (pH 8.0); clear, wavy boundary.

A1--19 to 26 inches, grayish-brown (10YR 5/2) heavy loam, dark grayish brown (10YR 4/2) when moist; weak, coarse, subangular blocky structure; hard, friable, sticky and slightly plastic; few very fine roots; many very fine tubular pores and many very fine interstitial pores; moderately alkaline (pH 8.0); clear, wavy boundary.

ACca--26 to 37 inches, grayish-brown (10YR 5/2) mixed with light brownish-gray (10YR 6/2) heavy loam, dark brownish gray (10YR 4/2) mixed with dark brown (10YR 4/3) when moist; massive; hard, friable, sticky and slightly plastic; few very fine roots; many very fine tubular pores and many very fine interstitial pores; strongly effervescent; disseminated lime; moderately alkaline (pH 8.1); gradual, irregular boundary.

off is very slow, and the erosion hazard is none to slight. Fertility is high. The available water capacity is 7.5 to 8.5 inches in the 60-inch root zone.

This soil is used for all irrigated and dryland crops normally grown in survey area (pl. VI, bottom). Capability unit I-1(14).

Sorrento sandy loam, 2 to 9 percent slopes (StC).--This gently sloping to moderately sloping soil occurs on small, long and narrow alluvial fans. It has a profile similar to the one described as representative for the series except that it is sandy loam throughout. In addition, it is somewhat more stratified, and has lenses of loam, silt loam, and clay loam.

Included in mapping are small areas of Mocho and Salinas soils.

Permeability is moderately rapid. Surface runoff is slow to medium, and the erosion hazard is slight to moderate. Fertility is high. The available water capacity is 7.5 to 8.5 inches in the 60-inch root zone.

breaks and alluvial fans.

Included in mapping are small areas of soils that are moderately or severely eroded and from which much of the surface layer has been removed. Also included are areas of Mocho soils and of Sorrento clay loam.

Permeability is moderate. Surface runoff is slow to medium, and the erosion hazard is slight to moderate. Fertility is very high. The available water capacity is 10 to 12 inches in the 60-inch root zone.

This soil is used for irrigated alfalfa, sugar beets, and walnuts and for dryland crops. Capability unit IIe 1(14).

Sorrento clay loam, 0 to 5 percent slopes, eroded (SwB2).--This gently sloping soil occurs on small, scattered, alluvial fans and flood plains. It has a profile similar to the one described as representative for the series except that this soil is clay loam throughout. In addition, this soil is subject to occasional overflow by runoff from surrounding areas.

Included in mapping are some eroded areas that are cut by shallow gullies; about half of the surface

C1--0 to 3/4 inch, (salty crust) pale-brown (10YR 6/3) silty clay loam, brown (10YR 5/3) when moist; weak, coarse and very coarse, platy structure; hard, friable, sticky and plastic; common fine interstitial pores; strongly effervescent, strongly saline, strongly alkaline (pH 8.5); abrupt, smooth boundary.

C2sa--3/4 inch to 7 inches, pale-brown (10YR 6/3) silty clay loam, dark brown (10YR 4/3) when moist; strong, very coarse, prismatic structure; very hard, firm, sticky and plastic; few micro roots, very few fine and many medium roots; few fine tubular pores and many medium and coarse interstitial pores; strongly effervescent; disseminated lime; thin coatings of crystalline salt on dry ped faces and faint mycelia-like salt accumulation within peds; strongly effervescent, strongly saline, strongly alkaline (pH 8.5); abrupt, wavy boundary.

C3sa--7 to 35 inches, dark-brown (10YR 4/3d, 4/3m) silty clay loam, with common fine, prominent mottles of very pale brown and very dark gray; massive; hard, friable, sticky and plastic;

upper part of the profile, but generally they contain appreciable amounts of salt in the lower part of the profile. All areas show signs of somewhat poor drainage within 1 to 2 feet of the surface, although all areas are now drained and the water table is no longer a problem.

Stutzville loamy sand (Sx). -This nearly level soil occurs on flood plains along the Cuyama River north and east of New Cuyama. Except for 6 to 20 inches of loamy sand material washed in and deposited over the silty clay loam soil, this soil has a profile similar to the one described as representative for the series. The soil has been drained, and the water table is no longer a problem. Salinity ranges from 0.4 to 2.0 percent.

Included in mapping are areas where there have been no deposits of overwash material. Areas where these deposits are more than 20 inches thick are also included.

Permeability is moderately slow. Surface runoff is very slow, and there is no erosion hazard. Where the soil is reclaimed, the available water capacity has been improved slightly by artificial means. Surface runoff is very slow, and the erosion hazard is none to slight. Fertility is high. Where the soil has been reclaimed, the available water capacity is 10 to 11 inches in the 60-inch root zone.

This Stutzville soil is used for range. Small areas have been reclaimed and are used for irrigated alfalfa, sugar beets, and pasture. Capability unit IIs-6(17); Saline range site.

Stutzville loam, strongly saline (Sza).--This soil is nearly level and occurs on low flood plains. It has a profile similar to the one described as representative for the series except that it has a loam surface layer about 10 to 20 inches thick. The content of soluble salts is 1 to 3 percent, and there is a salty crust 1/4 to 1 inch thick on the surface when the soil is dry.

Included in mapping are small areas of other phases of Stutzville soils. Some small areas of Panoche soils are also included.

Permeability is moderately slow. Surface runoff is very slow, and the erosion hazard is none to

pasture. Capability unit IIIs-6(17); Saline range site.

Swamp

Swamp (Szw) consists of very poorly drained soils that formed in low basin areas. There is very lit tle of this land type in the survey area. It occurs in several small tracts in the Cuyama, Santa Maria, and Los Alamos Valleys. The soil profile consists of strata of mineral soils and accumulations of partly decomposed plant materials, including peat. The soil material is very strongly acid to extremely acid and is waterlogged throughout most of the year. The vegetation is willows, cattails, sedges, and other water-tolerant plants.

Swamp is suitable for grazing only in dry years. Production of forage for livestock is very low. Any attempt to improve the drainage of this land type should be preceded by onsite investigation of the area to be improved. Capability unit VIIw-9(14); Saline range site.

6/4m) concretions 1/16 to 1/8 inch across make up less than 0.5 percent of mass and are uniformly distributed; slightly acid (pH 6.4); gradual, wavy boundary.

B21ir 24 to 36 inches, very pale brown (10YR 7/3) sand, light gray (10YR 7/2) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; very few fine roots; many very fine interstitial pores; concretions similar to those in A2 horizon make up 5 to 15 percent of mass and tend to occur in pockets 1 to 2 feet across; strongly acid (pH 5.3); gradual, smooth boundary.

B22ir--36 to 48 inches, very pale brown (10YR 7/3) sand, light gray (10YR 7/2) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; very few fine roots in upper part; many very fine interstitial pores; concretions make up 15 to 35 percent of horizon and occur mostly in pockets several feet across; concretions range in size from 1/2 inch across to as large as 3 by 6 inches, and are reddish brown in color (5YR 3/4, 4/4, 5/4m and 10YR 5/4 to

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have a gravelly, very gravelly, or impenetrable pan-like feel when augured.

Tangair sand, 0 to 2 percent slopes (TaA).--This nearly level soil occurs on terraces on the Vandenberg Air Force Base. It has the profile described as representative for the series. As a result of soil blowing, the surface has a slight hummocky relief. Depth to the very slowly permeable material is 50 to more than 60 inches. A perched water table sometimes forms above this material immediately following a rain or irrigation.

Included in mapping are small areas of Narlon, Oceano, and Marina soils.

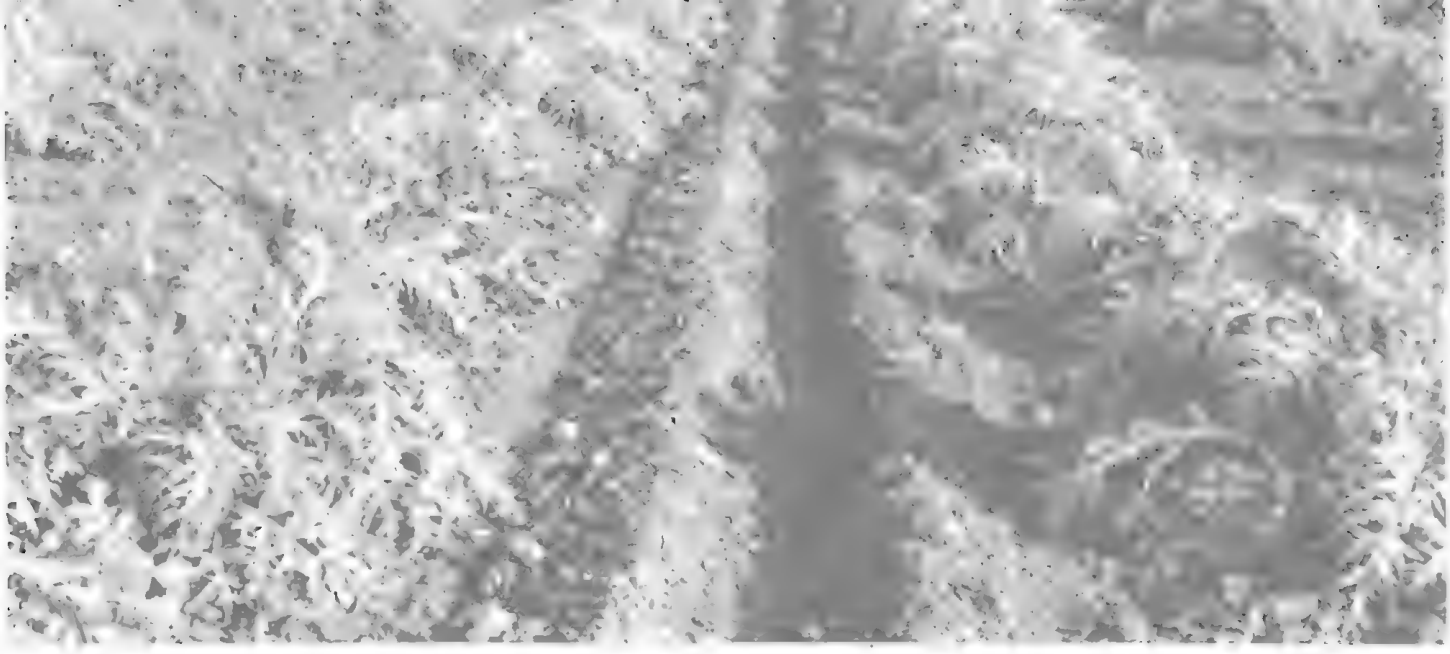
Permeability is rapid. Surface runoff is very slow to slow, and the hazard of erosion by water is none to slight. The hazard of soil blowing is high. Fertility is very low. The available water capacity is 3 to 4 inches in the 50 to more than 60 inches of rooting depth.

This soil is used for military and for other nonfarm purposes. Capability unit VIe-4(15); Sandy range site.

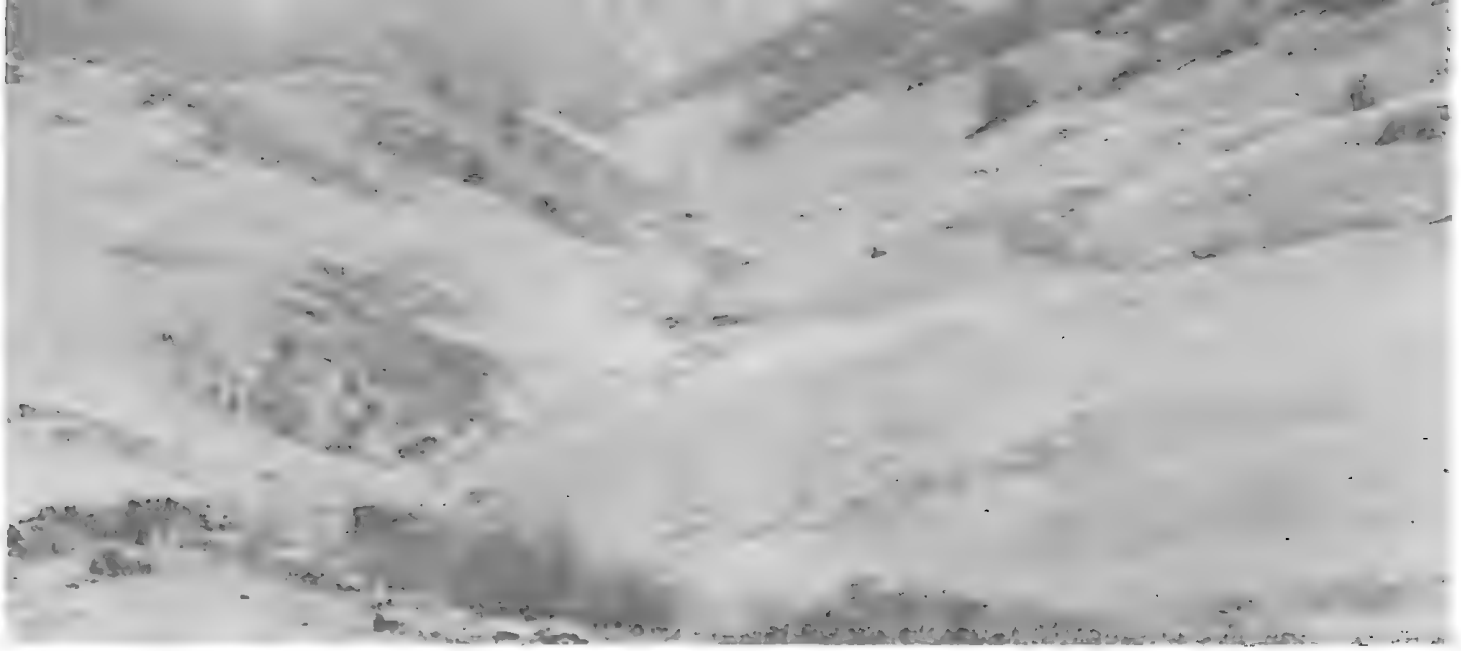
Terrace escarpments, loamy

Terrace escarpments, loamy (TdF) consists of the steep sides of terraces. The texture ranges from sandy loam to loam, but the profile varies from one area to another and within areas. Slopes range from 20 to 50 percent and average about 40 percent. This land type includes soil material of the Mocho, Sorrento, Salinas, and Ballard series. It also includes minor areas of soils from several other series. Areas of this land type are long, narrow, and irregular in shape. They are fairly well stabilized by brush or oak-grass cover. Runoff is rapid, and the erosion hazard is moderate to high. Some areas are deeply gullied by runoff water from the upper terraces.

This land type is suitable for grazing. Some areas are difficult to use because they occur within cultivated areas but are too steep for cultivation. On the other hand, they are too small to be separated out and used for grazing. Capability unit VIIe 1(15); Shallow Loamy range site.

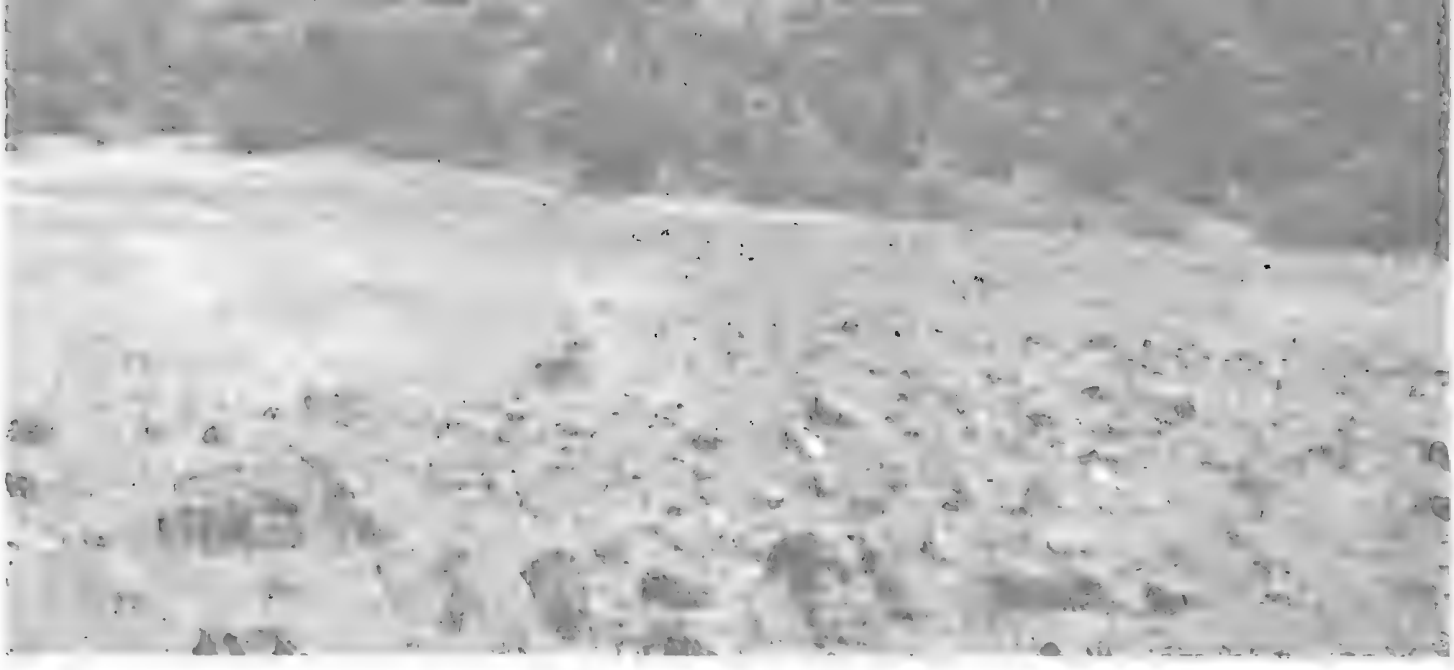


Artichokes on Bayshore loam, drained, in an area near the coast.



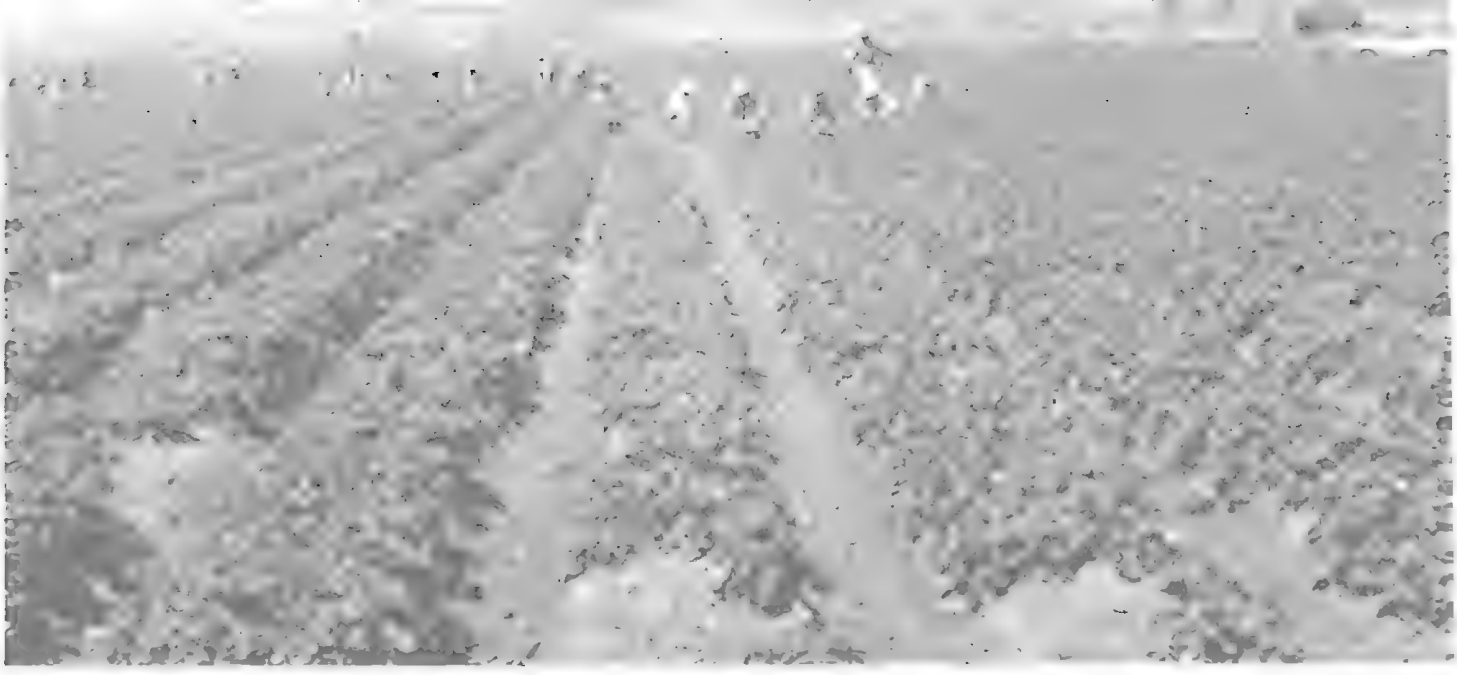
Climara-Toomes complex, 15 to 45 percent slopes. Climara clay has grass cover and Toomes clay loam has brush cover.

Profile of Kettleman fine sandy loam. Parent material has high lime content.



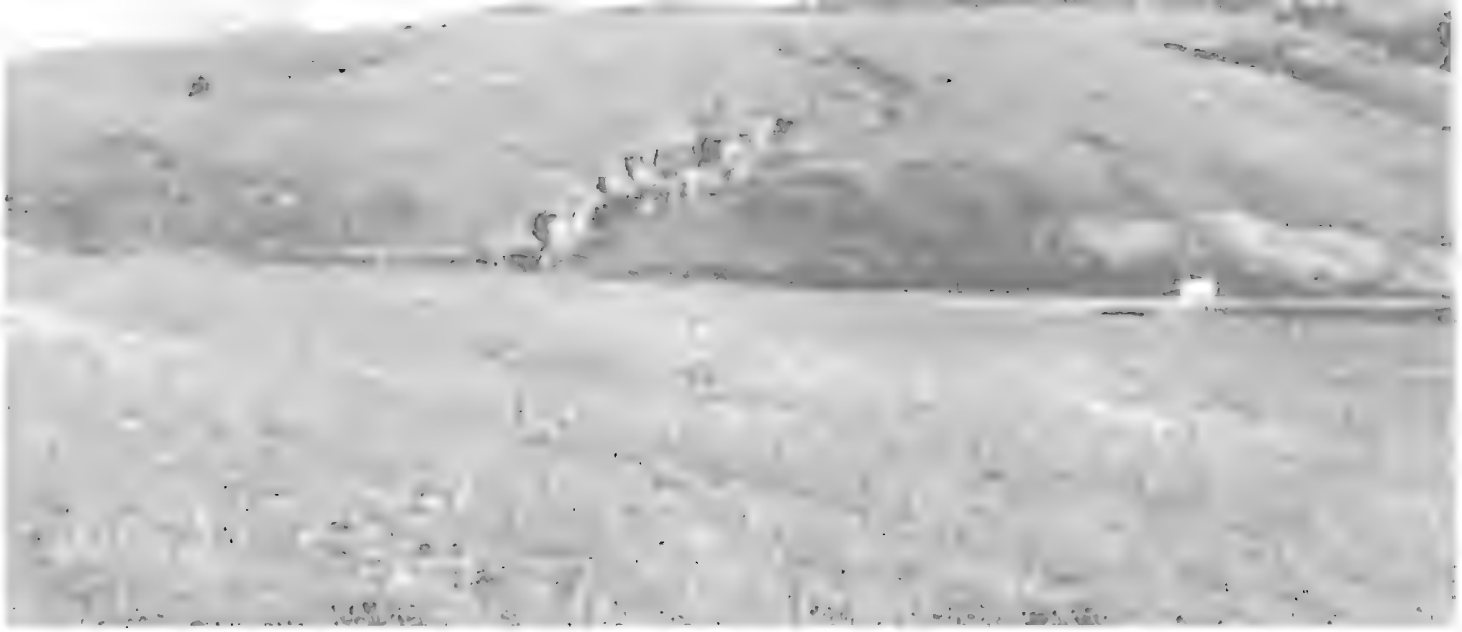
Montara rocky clay loam, 30 to 75 percent slopes.

Rough broken land is in the background. Panoche and Metz soils are in the foreground.



Strawberries on Sorrento sandy loam, 0 to 2 percent slopes.

Green chopped corn for dairy cattle on Sorrento sandy loam, 0 to 2 percent slopes. Land Resource Area 14, Capability unit I-1.



Claypan range site on Tierra soils in the background. Gullies have formed because this soil was previously cultivated.

In a representative profile, the surface layer is grayish-brown, gray, and light-gray loam about 12 inches thick. The subsoil is very dark grayish brown, dark-brown, and light brownish-gray clay and heavy clay loam about 31 inches thick. Below is pale-brown heavy clay loam. In some areas the surface layer is loamy sand, sandy loam, or clay loam.

Tierra soils are used mainly for range, but small areas are used for dryland grains or hay.

Representative profile of the Tierra series (2 1/2 miles south of Guadalupe on California Highway No. 1, 0.9 mile west on Brown Road from intersection of California Highway No. 1 and Brown Road, 1,980 feet south on Brown Road in head of gully):

Ap--0 to 7 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; massive; hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine interstitial pores and common very fine and medium tubular pores; strongly acid (pH 5.5); gradual, smooth boundary.

A1--7 to 11 inches, gray (10YR 5/1) loam, very dark gray (10YR 3/1) when moist; massive; hard, on ped faces, few moderately thick clay films in joints and in tubular pores; moderately alkaline (pH 8.0); clear, smooth boundary.

C--43 to 62 inches, pale brown (10YR 6/3) heavy clay loam, dark brown (10YR 4/3) when moist; many, large, prominent, reddish-brown (2.5YR 5/4) and yellowish-brown (10YR 5/4) mottles; strong, medium, angular blocky structure; very hard, firm, sticky and plastic; no roots; few very fine interstitial pores and very few very fine tubular pores; common, thin, very dark brown clay films on ped faces and joints; mildly alkaline (pH 7.5).

Texture of the A horizon ranges from loamy sand to clay loam. The A1 horizon is mostly gray or grayish brown but in some places is dark grayish brown or dark gray. Surface 1 inch is somewhat platy because of trampling by cattle. Depth to the Bt horizon is typically 6 to 26 inches. B3t and C horizons are 1 percent Monterey shale fragments. Reaction of the Bt horizon ranges from slightly acid to moderately alkaline, and of the C horizon, from neutral to moderately alkaline.

tracts surrounded by areas of steeper Tierra soils.

Included in mapping are areas of other Tierra soils that slope more than 9 percent. Also included are small areas of soils where the subsoil contains free lime. Some areas that have an acid reaction in the subsoil are also included.

Permeability is very slow. Surface runoff is slow to medium, and the erosion hazard is slight to moderate. Fertility is low. The available water capacity is 4 to 6 inches in the 16- to 22-inch root zone. Some moisture is available slowly from the clay subsoil.

This soil is used for range, hay, and grain, and is suited to shallow-rooted irrigated crops. Capability units IIIe-3(14) and IVe-3(15); Claypan range site.

Tierra sandy loam, 9 to 15 percent slopes, eroded (TnD2).--This strongly sloping soil occupies dissected terraces. It has a profile similar to the one described as representative for the series

Included in mapping are areas that are cut by some deep and some shallow gullies. Also included are areas of Tierra clay loam.

Permeability is very slow. Surface runoff is slow to medium, and the erosion hazard is slight to moderate. Fertility is moderate. The available water capacity is 4 to 6 inches in the 12- to 26-inch root zone. Some moisture is available slowly from the clay subsoil.

This Tierra soil is used mainly for range; small areas are used for dryland hay or grain. Capability units IIIe-3(14) and IVe-3(15); Claypan range site.

Tierra loam, 9 to 15 percent slopes (TrD).--This soil is strongly sloping and occurs on dissected old terraces. Depth to the clay subsoil is 12 to 24 inches.

Included in mapping are some gullied areas. Also included are areas of Tierra soils that have a clay loam surface layer. Other included areas consist of Chamise and Pleasanton soils.

areas of Chamise soils.

Permeability is very slow. Surface runoff is rapid, and the erosion hazard is high. Fertility is low. The available water capacity is 1 inch to 2 inches in the 6- to 10-inch root zone. A little moisture is available slowly from the clay subsoil.

This soil is used for range, wildlife habitat, and watershed. Capability unit VIIe-1(15); Claypan range site.

Tierra clay loam, 15 to 45 percent slopes (TsF).--This moderately steep to steep soil occurs on the sloping sides of dissected terraces. It has a profile similar to the one described as representative for the series except that the surface layer is clay loam 12 to 24 inches thick.

Included in mapping are small areas of other Tierra soils and of Chamise soils.

Permeability is very slow. Surface runoff is rapid, and the erosion hazard is high. Fertility is moderate. The available water capacity is 3 to 5 inches in the 12- to 24-inch root zone. A little moisture is available slowly from the clay subsoil.

7.5); abrupt, smooth boundary.

A12 6 to 16 inches, dark-brown (10YR 4/3) clay loam, dark brown (10YR 3/3) when moist; weak, medium, subangular blocky structure parting to moderate, fine, granular structure; hard, friable, sticky and plastic; common very fine, fine, and medium roots; common very fine interstitial pores, few very fine and fine tubular pores; horizon is about 10 percent small rock fragments; neutral (pH 7.0); abrupt, wavy boundary.

R--16 inches, fractured, dark yellowish-brown, altered basic igneous bedrock, with dark reddish-brown coating on rock fragments; few pockets of soil material from the A12 horizon in the bedrock; roots in cracks of the bedrock to about 24 inches in depth. Upper part of the bedrock is highly fractured, but the rock is firmer with increasing depth.

Toomes soils range in color from dark brown to brown. Texture ranges from light clay loam to clay loam. Reaction is neutral to mildly alkaline. Depth to bedrock ranges from 10 to 20 inches.

long, deep drainageways. The vegetation is sparse annual grasses and desert shrubs. Elevations range from 2,100 to 2,600 feet. The average annual rainfall is 5 to 8 inches, the average annual air temperature is about 58° F., and the frost-free season is 190 to 260 days. Wasioja soils are associated with Panoche and Kettleman soils.

In a representative profile, the surface layer is pale-brown and light yellowish-brown fine sandy loam about 26 inches thick. The subsoil is yellowish-brown and light yellowish-brown heavy sandy clay loam, light clay loam, and heavy sandy loam, under lain at 55 inches by yellow loamy sand. The lower part of the subsoil and the substratum are calcareous. In some areas the surface layer is cobbly fine sandy loam.

Wasioja soils are used for range, for dryland small grains, and for some irrigated crops.

Representative profile of the Wasioja series (NE1/4 NW1/4 sec. 2, T. 9 N., R. 26 W., Santa Barbara County, approximately 2 3/4 miles south and 1/2 mile west of Cuyama, 1 1/2 miles east on Foothill Road from intersection with Bell Road to entrance of

blocky structure; very hard, firm, sticky and plastic; very few micro roots; common very fine tubular pores and few very fine interstitial pores; continuous thin clay bridges between mineral grains, and few moderately thick clay films on ped faces; thin coating of lime on most ped faces and seams (this horizon is more compact and brittle than the B21t horizon); slightly effervescent in soil mass and strongly effervescent with lime in filaments and coatings; moderately alkaline (pH 8.2); gradual, irregular boundary.

B3t--44 to 55 inches, light yellowish brown (10YR 6/4) heavy sandy loam, yellowish brown (10YR 5/6) when moist; massive; very hard, firm, slightly sticky and slightly plastic; no roots; very few fine tubular pores and common very fine interstitial pores; many thin clay bridges between mineral grains; strongly effervescent; lime coatings in seams and slightly effervescent in soil mass; moderately alkaline (pH 8.2); gradual, irregular boundary.

the subsoil. Also included are some cobbly areas.

Permeability is moderately slow. Surface runoff is slow, and the erosion hazard is slight. Fertility is moderate. The available water capacity is 7 to 9 inches in the 60-inch root zone.

This soil is used for dryland grain, for range, and for irrigated alfalfa. Capability units IIe-1 (17) and VIIe 9(15); Arid Loamy range site.

Wasioja fine sandy loam, 5 to 9 percent slopes (WaC).--This moderately steep soil occurs on terraces.

Included in mapping are small areas of soil that has less clay in the subsoil but is otherwise similar to the Wasioja soils. Also included are some gravelly or cobbly areas.

Permeability is moderately slow. Surface runoff is slow to medium, and the erosion hazard is slight to moderate. Fertility is moderate. The available water capacity is 7 to 9 inches in the 60-inch root zone.

Wasioja cobbly fine sandy loam, 9 to 45 percent slopes (WcF).--This soil is strongly sloping to steep and occurs on dissected terraces. The waterways are deeply entrenched, and only small remnants of the old original terraces remain. This soil has a profile similar to the one described as representative for the series except that 15 to 30 percent of the entire soil profile is gravel and cobble stones.

Included in mapping are small areas where up to 75 percent of the soil profile is gravel and cobblestones.

Permeability is moderately slow. Surface runoff is medium to rapid, and the erosion hazard is moderate to high. Fertility is low. The available water capacity is 5 to 6 inches in the 60-inch root zone.

This soil is used for range, wildlife habitat, and watershed. Capability unit VIIe 9(15); Arid Loamy range site.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture or range,

2/ FRED COLLISON and RICHARD H. MORS, Soil Conservation Service, helped in preparing this section.

classes. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-6. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

Capability unit numbers generally are assigned locally but are part of a statewide system. All of the units in the system are not represented by the soils of the Northern Santa Barbara Area; therefore the numbers are not consecutive.

Capability units in California are given Arabic numbers that suggest the chief kind of limitation responsible for placement of the soil in the capability class and subclass. For this reason, some

fornia Mountains.

Resource area 20 is mainly in the Los Padres National Forest. Only fringes of it are in this survey area. These fringes are similar to resource area 15, and for the purposes of this survey, are part of resource area 15. No description, therefore, is given for resource area 20.

The resource areas of the Northern Santa Barbara Area and the capability units in each are described in the following pages, and suggestions are given for the use and management of the soils. The names of the soil series represented are mentioned in the description of each unit, but this does not mean that all the soils of a given series are in the unit. The capability unit designations for each soil in the survey area can be found in the "Guide to Mapping Units" at the back of this publication.

Resource Area 14

This resource area consists of the Santa Maria Valley, Los Alamos Valley, Lompoc Valley, upper

the Area and require only a minimum of conservation practices. They are used intensively for vegetables, flowers, and field crops (pl. VII, bottom). Soils on terraces are best suited to field crops.

These soils can be irrigated by furrows, borders, or sprinklers with little risk of damage from erosion. The rate at which water is applied and the length of runs vary with soil texture. In leveling, cuts and fills cause little permanent damage. Deep cuts in terrace soils should be avoided. Also, deep gullies form quickly where tail water concentrates and runs off terraces, and safe disposal of excess water is needed.

Organic matter is rapidly depleted. It can be supplied by growing a green manure crop and returning all crop residue to the soil or by applying barnyard or feedlot manure. Subsoiling is needed periodically to break tillage pans. Intensely cultivated areas require adequate fertilization. Most crops need nitrogen and some need phosphorus and other fertilizers. Soil amendments, such as gypsum, are needed occasionally to improve soil structure and increase water intake.

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gated and dryland crops. It is not so well suited to tree crops as the soils in unit I-1(14) because the subsoil is weakly cemented and slowly permeable. The water table is perched in some places after a rain or after irrigation.

Diversions or dikes are needed to protect this soil against runoff from adjacent, higher areas, and gully control is needed to protect this soil against further erosion. Irrigation water should be applied carefully to avoid runoff and a perched water table.

Capability Unit IIs-0(14)

This unit consists of moderately deep and deep, well-drained sandy loams to loams that are underlain by a rapidly or very rapidly permeable sand or gravel substratum. These soils are in the Agueda, Mocho, and Sorrento series. They are mostly on flood plains in the Santa Maria Valley. Slopes are 0 to 2 percent. The sand or gravel is at a depth of 30

This soil can be irrigated by furrows or sprinklers with little risk of damage from erosion. Because of the high gravel content, it tends to be droughty and thus needs frequent light irrigations. Overirrigation wastes water and leaches nutrients. The gravel content also limits the amount of tillage used. Leveling for irrigation is no problem because the soil is deep and cuts and fills have little permanent damaging effect.

Organic matter is rapidly depleted. It can be supplied by growing a green-manure crop and returning all crop residue to the soil or by adding barn yard or feedlot manure. Subsoiling is needed periodically to break tillage pans that develop under cultivation. Adequate fertilization is needed in areas under intensive cultivation. Nitrogen is generally needed. The amount of fertilizer to be applied should be based on the results of soil or plant-tissue tests. Soil amendments, such as gypsum, are occasionally needed to improve soil structure and increase water intake.

moderately rapid to very rapid. The available water capacity is 5 to 11 inches in the 30 to more than 60 inches of rooting depth. Natural fertility is moderate to high.

These soils are suited to almost all crops grown in this area and require only a minimum of conservation practices. Tree crops are often adversely affected during periods of flooding.

Diversions that have an adequate water-disposal system are needed as protection against concentrated flows of runoff from canyons or from soils at higher elevations. Dikes or levees are needed along some streams or channels to protect the soils from inundation.

These soils can be irrigated by furrows, borders, or sprinklers with little risk of damage from erosion. The length of runs and the rate at which water is applied vary with the soil texture. Leveling for irrigation is no problem because the soils are deep and cuts and fills have little permanent damaging effect.

Organic matter is rapidly depleted. It can be supplied by growing a green-manure crop and returning all crop residue or by applying barnyard or

table. Adequate leveling and provision for disposing of excess water also help in controlling the water table.

Erosion is no problem, but occasionally, overflow and ponding are hazards. Diversions or water-disposal systems may be needed. Crop rotations, green manure crops, and fertilization maintain and improve productivity.

Capability Unit IIIe-1(14)

This unit consists of moderately deep to very deep, well-drained sandy loams to loams of the Chamise, Garey, and Pleasanton series. These soils are on terraces. Slopes are 2 to 9 percent. The subsoil is moderately slowly and slowly permeable and thus, restricts root development. The erosion hazard is moderate. Fertility is low to moderate. The available water capacity is 4 to 9 inches in the 20 to more than 60 inches of rooting depth.

These soils are well suited to close-growing crops, such as pasture or hay. Field, truck, or orchard crops can be grown if erosion can be

avoided because the excess water accumulates above the subsoil and damages roots. Breaking up the clay layer is most difficult because the soil seals over soon after rewetting. Erosion is a serious problem during rainy periods in winter unless the surface is protected.

Organic matter can be supplied through the use of green-manure crops, crop rotations, and crop residue. The response to fertilization is generally better on these soils than on the deeper soils.

Capability Unit IIIs-4(14)

This unit consists of very deep, somewhat excessively drained loamy sands of the Corralitos and Metz series. These soils developed on recent alluvial fans and have slopes of 0 to 9 percent. They are rapidly to moderately permeable and are low in fertility. Their coarse texture is the most important characteristic. They are susceptible to wind erosion, particularly the Corralitos soils, and in some areas, to occasional overflow. The available water capacity is 4 to 6 inches in the 60 inches of rooting depth.

because the soils dry out too slowly. Tile or open ditch drainage systems are needed in irrigated areas to lower the water table and permit leaching. After drainage is established, the soils should be managed the same as those in capability unit IIw-2 (14). Drainage is difficult because of the slow permeability and the lack of drainage outlets.

Capability Unit IVe-4(14)

The soils of this unit are moderately deep to very deep, moderately well drained to excessively drained loamy sands and sands of the Betteravia, Corralitos, Marina, and Oceano series and the Betteravia, dark variant, and Narlon, hardpan variant series. These soils are on alluvial fans, terraces, and low hills. Slopes are 0 to 15 percent. The risk of erosion is very high. The Corralitos and Oceano soils are rapidly permeable, are very deep, and have little or no increase in clay content with increasing depth. Marina soils have clay bands in the subsoil and are moderately permeable. The Betteravia, Betteravia, dark variant, and Narlon,

These areas are suitable for limited grazing late in summer and in fall. Production is usually very low and the quality of feed is normally poor. Occasionally grain or hay crops have been grown in selected spots, particularly during dry periods. Many areas are not suitable for cultivation.

The native vegetation in areas of Marsh consists of pickleweed, saltgrass, poison hemlock, alkali sacaton, and other salt-tolerant plants. In areas of Swamp it generally consists of sedges, cattails, willows, and other water-tolerant plants, and in areas of Sandy alluvial land, wet, of water-tolerant plants, such as alders, willows, and sedges.

A detailed onsite study is needed for each area before any attempt is made to improve the drainage.

Capability Unit VIIw-4(14)

This unit consists of Cobbly alluvial land and Sandy alluvial land, both of which are along stream channels. Both are periodically subject to floodwater that channels and scours the surface. Soil material may be removed or deposited during

Capability Units VIIIe-4(14) and VIIIw-4(14)

Coastal beaches, Dune land, and Riverwash are in these units. These areas are valuable for recreation or for raw materials but are not suitable for farm use. They are too sandy and unproductive for crops, and the vegetation is too sparse for grazing. Riverwash is a valuable source of sand and gravel for construction and roads.

Dune fences and special vegetation are needed to keep sand from blowing and to protect valuable cropland or rangeland. Protecting the vegetation on partly stabilized dunes keeps dunes from becoming active.

Resource Area 15

All soils outside the major valleys and those in fringes of Resource Area 20 are in this area. None are irrigated. The area is mainly hilly to mountainous but includes some low lying benches and

range site."

Capability Unit IIIe-1(15)

The soils in this unit are well-drained, moderately deep to very deep sandy loams to clay loams of the Ballard, Botella, Elder, Garey, Linne, Pleasanton, Salinas, Sorrento, and Santa Lucia series. These soils are on alluvial fans, terraces, or low rolling hills and have slopes of 2 to 15 percent. In most areas the soils are more than 60 inches deep. Linne and Santa Lucia soils are 30 to 60 inches deep over bedrock. Garey soils have weakly cemented lenses at a depth of 20 to 36 inches, but the lenses do not prohibit root or water penetration. In a few areas where slopes are 0 to 2 percent, the soils are subject to overflow and erosion. The erosion hazard is slight to moderate in cultivated areas. Natural fertility is low to very high. Permeability is typically moderately rapid to moderately slow but is slow in Garey soils. The available water capacity is 6 to 12 inches.

loams. They are in the Ballard, Chamise, Crow Hill, Elder, Gazos, Linne, Pleasanton, Santa Lucia, Shedd, and Shedd, diatomaceous variant, series. These soils are on alluvial fans, terraces, and uplands. Slopes range from 2 to 30 percent. The upland soils are underlain by sandstone or shale or weakly consolidated sediments at a depth of 20 to 60 inches. Fertility is low to high. Permeability is moderately rapid to moderately slow in most areas but is slow in Chamise soils. The available water capacity is 3 to 10 inches. The erosion hazard is slight to high.

These soils are in small, scattered areas throughout the survey area. They are mainly used as range. They are suitable for occasional tillage but not for more than 1 year in 5. Reseeding and fertilization improve the grass cover.

All tillage should be done on the contour. Residue from cultivated crops should be used as a surface mulch for protection against erosion. Grazing should be limited to protect the plant cover.

Range management for these soils is described under the heading "Loamy range site."

weakly cemented pan at a depth of 24 to 36 inches. Both soils are susceptible to wind erosion, and in places, to water erosion also. Both have low to very low natural fertility and hold 4 to 5 inches of water available to plants. Permeability is rapid in the Corralitos soil and slow in the Betteravia, dark variant.

These soils are not suitable for dryland cultivation. They are droughty and easily eroded by wind; production is very low. Many areas need extensive gully control before they can safely be cultivated. In selected areas cultivation may be needed occasionally to re-establish or improve the grass cover.

All tillage should be done on the contour or across the slope. Residue from crops or native vegetation should be used as a surface mulch for protection against erosion.

Areas used for irrigated crops are described under the heading "Resource Area 14." Range management for these soils is described under the heading "Sandy range site."

These soils are suitable for grazing. Reseeding grasses and legumes improves the forage in selected areas. Fertilization also is beneficial in selected areas. The vegetation is mainly annual grasses and forbs and oak trees. Areas that are fairly open are moderately productive; forage production decreases as the oak tree growth becomes denser.

Range management for these soils is described under the headings "Clayey Loamy range site" and "Shallow Loamy range site."

Capability Unit VIe-3(15)

The soils in this unit are moderately well drained and well drained sandy loams to clay loams that have a slowly or very slowly permeable clay subsoil. These soils are in the Positas, San Benito, Santa Ynez, and Tierra series. They are on terraces and have slopes of 2 to 45 percent. They are highly erodible in cultivated or overgrazed areas. Roots and

for irrigated pasture. Production is fair if fertilization is adequate.

Range management for the soils is described under the heading "Sandy range site."

Capability Unit VIe-5(15)

The soils in this unit are moderately deep to deep, well-drained clays on uplands. They are in the Climara, Diablo, San Benito, and Toomes series. Slopes are 15 to 45 percent. The depth to shale, sandstone, or basic igneous rock ranges from 20 to more than 60 inches. Fertility is medium to high. Permeability is slow. The available water capacity is only 3 to 8 inches. The erosion hazard is moderate to high.

These soils are best suited to range. If overgrazed or cultivated, they are susceptible to erosion. Selected sites can be cultivated occasionally to establish new stands of grasses.

Range management for these soils is described under the heading "Clayey range site."

terraces and low hills. Slopes are dominantly 9 to 45 percent. Severely eroded areas are included where slopes are less than 9 percent. The soil depth ranges from about 6 inches in eroded areas where there is a weakly cemented hardpan to more than 60 inches in areas where there are no subsoil restrictions. The soils in this unit hold 0.75 inch to 6 inches of moisture available to plants. They are very low in natural fertility. All are susceptible to wind erosion and, in most areas, to water erosion if the cover is removed. Permeability is rapid to very slow.

These soils are suitable for grazing. The native vegetation is mainly brush. In some areas of Arnold and Marina soils it is oak trees and a sparse annual grass understory. These areas provide fair grazing.

Range management for the soils is described under the headings "Sandy range site," "Eroded range site." and "Shallow Sandy range site."

Capability Unit VIIe-5(15)

This unit consists of well-drained clays in mountainous areas. These soils are in the Diablo and

it is desert trumpet.

Montara soils receive 12 to 25 inches of rainfall annually. They overlie residuum derived from serpentine rocks and have a low calcium-magnesium ratio. The vegetation is a sparse cover of annual grasses, forbs, and scattered sagebrush and juniper trees.

These soils are suitable for light grazing. Forage production is low to fair on Montara, Wasioja, and Kettleman soils and very low on Ballinger soils.

Range management for Wasioja and Kettleman soils is described under the heading "Arid Loamy range site;" Ballinger soils, "Gypsum Hills range site;" and Montara soils, "Shallow Loamy range site."

Capability Unit VIIIs-1(15)

Igneous rock land, Mine pits and dumps, Sedimentary rock land, and soils of the Lopez and Maymen pasture, and orchards. Many areas are idle.

Capability Unit I-1(17)

This unit consists of very deep, well-drained sandy loams and loams on alluvial fans and flood plains. Slopes are 0 to 2 percent. These soils are in the Panoche series. They are stratified and more than 5 feet deep. The available water capacity is 7.5 to 11 inches. Permeability is moderately slow to moderate. There is little or no erosion hazard.

These soils are used mainly for alfalfa but are well suited to all crops commonly grown in the Area. They can be irrigated by furrows, borders, or sprinklers with little risk of damage from erosion. The

similar to the soils in unit I-1(17). They are drained at present but show evidence of having formed under somewhat poor drainage conditions. They hold 9 to 13 inches of water available to plants. Permeability is slow to moderately slow; it is slower than in less stratified soils. Natural fertility is high.

Unless leached of salts, these soils should be used only for salt-tolerant crops, such as pasture grasses, sugar beets, and barley. If reclaimed, they are well suited to alfalfa and all crops commonly grown in the Area. They can be reclaimed through repeated deep flushing of water through the soil and by growing a salt-tolerant crop, such as barley. Smoothing the area and applying water uniformly are important. Provision should be made for disposing of tail water to prevent prolonged ponding at the ends of fields. No soil amendments are needed; the soils are abundantly supplied with calcium.

Furrows, borders, or sprinklers can be used for irrigation with little risk of damage from erosion. The length of runs and the rate at which water is

they are eroded.

These soils are best suited to deep rooted crops, such as alfalfa, potatoes, and fruit. Scouring and deposition are serious problems in areas that receive runoff from higher lying side streams or floodwater from major streams. Diversions and grass waterways are needed. Levees should be installed along the major streams.

Cuts can be made in leveling for irrigation without damaging the soils. The most efficient irrigation is by sprinklers. Furrows or borders can be used if runs are less than 350 feet long. Barnyard manure increases the water-holding capacity and improves fertility.

Capability Unit IIIs-6(17)

The soils of this unit are very deep, somewhat poorly drained, and moderately to strongly saline. They are in the Stutzville series. They are on flood plains and have slopes of less than 1 percent. They show evidence of past poor drainage but are now

drainage, alkali, and erosion. Each of these four factors is evaluated on the basis of 100 percent. A rating of 100 percent expresses the most favorable, or ideal condition, and lower percentage ratings are given for conditions that are less favorable for crop production.

The index rating for a soil is obtained by multiplying the four factors, A, B, C, and X. Thus, any one factor may dominate or control the final rating. For example, a soil may have an excellent profile justifying a rating of 100 percent for factor A, excellent surface soil conditions justifying 100 percent for factor B, a smooth, nearly level surface justifying 100 percent for factor C, but a high accumulation of salts or alkali that would give a rating of 10 percent for factor X. Multiplying these four ratings gives an index rating of 10 for this soil. The high accumulation of salts would

3/ By Dr. FRANK HARRADINE, professor of soil morphology, Department of Soils and Plant Nutrition, University of California, Davis.

specified acreage. No entry in the yield column indicates that the actual or estimated yield is below the level necessary for a reasonable return under good management.

The climate in this Area varies considerably within distances of only a few miles and strongly affects the yield and management of some crops. Near the coast, crops in summer are affected by persistent fog and cool onshore winds. Inland, temperatures are higher in summer and lower in winter, particularly at night. For soils that occur both inland and along the coast, yields are given for the most favorable climatic conditions.

Because the climate and the soil properties are so variable, only a few management practices are common for most crops grown in this Area. These practices include proper seedbed preparation and control of insects and weeds. The high level

4/ By WARREN E. BENDIXEN, MARVIN J. SNYDER, and GEORGE E. GOODALL, farm advisors, Agricultural Extension Service, University of California.

Botella clay loam, 2 to 9 percent slopes	7.5	---	21	22	---
Botella clay loam, 2 to 15 percent slopes, eroded	---	---	19	19	---
Botella clay loam, wet, 0 to 2 percent slopes	---	---	19	---	---
Camarillo sandy loam 1/	---	350	23	---	---
Camarillo sandy loam, drained	6.5	350	23	22	---
Camarillo very fine sandy loam 1/	---	350	23	---	---
Camarillo silty clay loam 1/	---	350	23	---	---
Chamise sandy loam, 5 to 9 percent slopes	---	---	17	---	---
Chamise shaly sandy loam, 9 to 15 percent slopes	---	---	15	---	---
Chamise loam, 2 to 9 percent slopes	---	---	19	---	---
Chamise shaly loam, 9 to 15 percent slopes	---	---	17	---	---
Corralitos sand, 0 to 2 percent slopes	6.5	---	---	15	---
Corralitos sand, 2 to 15 percent slopes	6.5	---	---	---	---
Corralitos loamy sand, 0 to 2 percent slopes	6.5	---	---	17	---
Corralitos loamy sand, 2 to 9 percent slopes	6.5	---	---	17	---
Cropley silty clay	7.5	---	24	---	---
Diablo silty clay, 9 to 15 percent slopes	---	---	22	---	---
Elder sandy loam, 0 to 2 percent slopes	8.5	---	22	25	35
Elder sandy loam, 0 to 2 percent slopes, eroded	7.5	---	21	22	---
Elder sandy loam, 2 to 9 percent slopes, eroded	---	---	19	19	---
Elder sandy loam, 9 to 15 percent slopes, eroded	---	---	19	---	---

See footnotes at end of table.

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2.5	17.5	800	28	350	---	-----	20	----
3.5	17.5	1,000	26	500	250	-----	22	----
2.5	17.5	800	30	350	---	-----	20	----
2.5	---	800	30	350	---	-----	20	----
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---	---	-----	---	---	---	2,250	---	1.25
---	---	-----	22	---	---	2,750	---	1.25
---	---	-----	---	---	---	-----	---	1.25
2.5	---	800	28	350	---	-----	23	----
---	---	-----	---	---	---	-----	---	----
---	21	-----	30	---	350	2,750	25	1.25
---	---	-----	28	---	---	2,500	22	1.25
---	---	-----	---	---	---	-----	---	1.25
---	---	-----	---	---	---	-----	---	----

Panoche loam, overflow, 0 to 2 percent slopes	8.5	---	---	---	---
Pleasanton sandy loam, 0 to 2 percent slopes	7.5	---	21	22	32.5
Pleasanton sandy loam, 2 to 9 percent slopes	7.5	---	19	---	---
Pleasanton sandy loam, 9 to 15 percent slopes	---	---	17	---	---
Pleasanton very fine sandy loam, 0 to 2 percent slopes	7.5	---	22	23	32.5
Pleasanton very fine sandy loam, 2 to 9 percent slopes	7.5	---	19	21	---
Pleasanton gravelly very fine sandy loam, 9 to 15 percent slopes	---	---	17	---	---
Positas fine sandy loam, 2 to 9 percent slopes	---	---	17	---	---
Salinas loam, 0 to 2 percent slopes	8.5	350	24	25	35
Salinas loam, 2 to 9 percent slopes	7.5	---	22	---	---
Salinas loam, overflow, 0 to 2 percent slopes	8.5	350	24	25	35
Salinas silty clay loam, 0 to 2 percent slopes	8.5	350	24	25	35
Salinas silty clay loam, 2 to 9 percent slopes	7.5	---	22	22	---
Salinas and Sorrento loams, 9 to 15 percent slopes	---	---	20	---	---
Santa Lucia shaly clay loam, 9 to 15 percent slopes	---	---	17	---	---
Santa Ynez gravelly fine sandy loam, 2 to 9 percent slopes	6.5	---	17	19	---
Santa Ynez clay loam, 2 to 9 percent slopes	6.5	---	19	29	---
Sorrento sandy loam, 0 to 2 percent slopes	8.5	350	22	25	35

See footnotes at end of table.

---	---	-----	30	---	300	-----	25	----
---	---	-----	28	---	---	2,750	22	----
---	---	-----	---	---	---	-----	20	.75
---	---	-----	---	---	---	-----	---	----
---	---	-----	28	---	---	2,750	23	.75
---	---	-----	---	---	---	-----	21	.75
---	---	-----	---	---	---	-----	18	----
---	---	-----	---	---	---	-----	21	----
3.5	21	1,000	30	500	350	3,500	25	1.75
---	---	-----	---	---	---	-----	22	1.75
3.5	21	1,000	30	500	350	3,500	25	1.25
3.5	---	1,000	30	500	---	-----	25	1.25
---	---	-----	---	---	---	-----	22	1.25
---	---	-----	---	---	---	-----	---	----
---	---	-----	---	---	---	-----	---	----
---	---	-----	---	---	---	-----	19	.75
---	---	-----	---	---	---	-----	19	.75
3.5	21	1,000	30	500	350	3,500	25	1.75

442-595 O - 72 - 8

is needed. Nitrogen can be supplied by applying manure and commercial fertilizers. About 30 pounds per acre is commonly applied every month during the heavy growing season, May through November. Smaller amounts are usually applied in other months. Phosphorus and potassium fertilizers are needed where these elements are naturally deficient. Artichokes commonly require frequent irrigation. Usually five to eight irrigations are needed during the growing season. The soil should be wet to the root depth. Adequate surface drainage should be provided because ponding is detrimental. In areas that have a temporary or permanent high water table, artificial drainage by tile or open ditches is needed.

Barley

Barley is dryfarmed on a wide variety of soils throughout the coastal part of the Area. Yields vary widely, mainly because of differences in the amount of rainfall. A properly prepared seedbed should be friable to insure good water and root

rates as high as 30 tons per acre. Commonly, 10 to 15 tons per acre of manure, or a green-manure crop and 1,000 to 1,500 pounds per acre of a mixed fertilizer, are applied before planting. In addition, one or two sidedressings of 150 to 200 pounds per acre of a nitrogen fertilizer, such as ammonium nitrate or sulfate of ammonia, are applied during the growing season. Phosphorus and potassium fertilizers should be applied if response is good. Minor elements are naturally deficient in some areas and amendments are required.

Much of the broccoli is grown during the rainy season. The amount of irrigation required depends on local rainfall and the needs of the crop. Generally, about 1 acre-foot of water is required per crop.

Carrots

Carrots are grown in the Santa Maria and Lompoc Valleys where the cool summers and deep, well-drained sandy loams and loams favor carrot production. Nitrogen fertilizer is required on practically

Corn

Corn is grown in the coastal valleys on a wide variety of soils. It is used for silage or green chop mainly for dairy cattle but also for beef cattle. A well prepared seedbed and irrigation before planting are essential for a good stand. Nitrogen fertilizer is required on almost all soils. About 200 pounds per acre is needed for a yield of 30 tons per acre, or an average of 6 to 7 pounds of nitrogen per ton of yield. Nitrogen should be applied in more than one application as sidedressing. Phosphorus and potassium are needed in places. The amounts to be applied are best determined by soil and plant tests. Zinc is commonly deficient. An application of 20 pounds of zinc sulfate per acre is sufficient for several years. Zinc sulfate can also be applied on the crop foliage at the rate of 1 pound per acre to correct the deficiencies for one crop.

About 2 to 2 1/2 acre-feet of water is needed for a good stand of corn. Frequent, light irrigations are needed when the crop is young.

Strawberries

Strawberry production in this Area is limited mainly to the Santa Maria Valley, in the vicinity of and east of Santa Maria. Fertilization requirements depend on the crop variety, the soil type, and the time of year. Soil and plant analysis is desirable in order to keep the fertility level high and prevent excessive fertilization and accumulation of salts. Furrows are used for irrigating. Low beds and nearly filled furrows keep salt accumulation to a minimum. Sprinklers to leach out salts that have accumulated in the beds may be needed during periods when there are no blossoms or berries on the plants.

Sugar Beets

Sugar beets are grown throughout the Area, wherever irrigation water is available. They commonly require 2.5 to 4 acre-feet of water, depending

The main destructive rodents in the Area are California ground squirrels, pocket gophers, and a variety of field mice.

California ground squirrels are to be found throughout the Area. At present their population is fairly well controlled through the use of poisons. The poisons are handled professionally; they are not suitable for use by the general public. These rodents do great damage by digging holes and eating crops. Occasionally they carry bubonic plague. Water flowing through rodent holes causes many gullies to form and washes out or otherwise damages reservoirs, levees, and ponds. Much irrigation water flows into rodent holes, seeps out below the root zone, and is wasted. Horses and livestock are in danger of breaking their legs by stepping into deep rodent holes.

Pocket gophers also are to be found throughout the Area. They are particularly active in fairly level soils. They eat practically all types of vegetation and sometimes destroy large acreages of crops. They damage earthworks and soils in much

to 10-inch precipitation zone of the Cuyama Valley, it is open grassland or shrub.

Range Sites

Range sites are kinds of soils that produce significantly different kinds or amounts of vegetation. Each site has a different potential for production of forage and presents different management problems. The original range forage plants were perennials and annuals. As a result of prolonged overgrazing and drought, these plants have been replaced largely by grasses and forbs introduced from the mediterranean region during Spanish colonization. These introduced plants are mostly cool-weather growing annuals. They take full advantage of the soil moisture while it is available in order to produce and mature seed before

5/ Prepared by IRVIN L. SEALANDER, range conservationist, Soil Conservation Service.

The "Guide to Mapping Units" at the back of this publication designates the range site for each soil in the survey area.

Clayey Range Site

The soils of this site are moderately permable to slowly permeable, moderately deep to very deep clay loams to clays. They are in the Botella, Chamise, Climara, Diablo, Linne, Los Osos, San Benito, and Shedd series. They formed in material weathered from basic igneous rock and sandstone or shale, or in alluvium. Slopes are 9 to 75 percent. The available water capacity is moderate to very high. Fertility is moderate to high. This site has the highest productive potential of any in the survey area. It occurs throughout the western part of the survey area, except along the coast.

The plant cover is grass and a few scattered oaks. This site produces heavy stands of wild oats and burclover, smaller amounts of soft chess, ryegrass, and filaree, and patches of needlegrass and other perennial grasses.

This site is not productive because it is eroded. Herbaceous cover is sparse. It is dominantly red brome, nitgrass, weedy annuals and other less desirable and undesirable plants.

The soils do not respond to management. Range seeding and fertilization are desirable only for controlling erosion.

The estimated total annual yield per acre is 600 pounds air-dry weight in favorable years and 100 pounds in unfavorable years.

Loamy Range Site

The soils of this site are moderately rapidly permeable to slowly permeable, moderately deep to very deep sandy loams to clay loams. They are in the Ballard, Botella, Camarillo, Chamise, Contra Costa, Crow Hill, Elder, Garey, Gazos, Pleasanton, Salinas, San Andreas, Santa Lucia, and Sorrento series. They formed on old alluvial terraces, in material weathered from sandstone or shale or in medium-textured to coarse-textured alluvium. Slopes are 0 to 45 percent. Fertility is low to very high.

deep and are severely eroded. Slopes are 5 to 75 percent. Fertility is low to very low. The available water capacity is low. The productivity of this site is much lower than that of the Loamy range site.

The plant cover is an open to dense stand of brush. California sagebrush, flattop buckwheat, and purple sage are dominant at lower elevations. As elevation increases, these shrubs are mixed with and replaced by ceanothus, scrub oak, manzanita, and other chaparral species. The understory is soft chess, wild oats, ryegrass, filaree, and other annuals, and needlegrass and other perennial grasses. The herbaceous understory is sparse.

If depleted by heavy grazing or by fire, the desirable species in the understory are replaced by red brome, nitgrass, popcornflower, annual lupines, and other less desirable and undesirable plants.

Only the Lodo and Gaviota soils respond to brush control, range seeding, and fertilization. On all other soils in this site, brush control and seeding are desirable only for erosion control and fire protection.

the Positas, Santa Ynez, and Tierra series. Slopes are dominantly 2 to 45 percent. The available water capacity is low to moderate. Fertility is low. Some areas are severely eroded (pl. VIII, bottom). This site occurs in the western part of the survey area. It is commonly intermingled with the Clayey and the Loamy range sites.

The plant cover is grass, dominantly soft chess, wild oats, ripgut brome and other desirable and less desirable annuals, and a few patches of needlegrass, creeping wildrye, and other perennial grasses. In places filaree is abundant. Burclover occurs, but not as extensively as on the Clayey range site. This site is similar to the Loamy range site in plant composition but is not so productive.

Under heavy grazing, the desirable grasses are replaced by less desirable grasses and ripgut brome, poverty fescue, and weedy annuals. In some years, tarweed is dominant on well-managed sites; it grows abundantly on heavily grazed and depleted areas.

All except the severely eroded and cobbly soils of the Positas and Tierra series are suitable for

so good as on the Clayey and Loamy range sites.

The estimated total annual yield per acre is 1,200 pounds air-dry weight in favorable years and 300 pounds in unfavorable years. Range seeding and fertilization can increase forage production from one and a half to two times this amount.

Eroded or Shallow Sandy Range Site

Terrace escarpments and soils of the Arnold, Betteravia, Marina, and Oceano series are in this site. All are rapidly permeable to very slowly permeable sands and loamy sands that are shallow to very deep and are severely eroded. Some of the soils have a claypan or a hardpan. Slopes are 0 to 75 percent. The available water capacity is very low to low. Fertility is low.

The plant cover is a scattered to open stand of California sagebrush, purple sage, and other shrubs, and a sparse understory of red brome, nitgrass, annual lupine, and other weedy species. There are also patches of soft chess and filaree.

water capacity is low to high. Fertility is low to high. This site is low in productivity because it is in the zone of low and erratic rainfall in the Cuyama Valley.

The plant cover is annual grasses and forbs, mainly red brome and cutleaf filaree, and scattered juniper, flatop buckwheat, and other shrubs. The original plant cover was bunchgrass, dominantly needlegrass. Recurring drought and heavy grazing have almost completely destroyed the original plant cover.

Response to range seeding generally is unreliable because rainfall is low and erratic. In places seeding is successful on the less sloping soils of the Panoche series.

The estimated total annual yield per acre is 500 pounds air-dry weight in favorable years and 50 pounds in unfavorable years.

Arid Sandy Range Site

The soils of this site are rapidly permeable, very deep loamy sands of the Metz series. They

pounds air-dry weight in favorable years and 50 pounds in unfavorable years.

Saline Range Site

Marsh, Sandy alluvial land, and soils of the Stutzville series are in this site. All are moderately slowly permeable and slowly permeable, very deep, saline, stratified loamy sands and silty clay loams. They are on valley floors and flood plains subject to occasional overflow. Slopes are 0 to 2 percent. This site is in the Cuyama Valley.

The dominant plant cover is saltgrass, saltbush, pickleweed, alkali heath, iodinebush, and other alkali-tolerant plants. There are also stands of red brome and other annuals that are abundant in years of high rainfall.

Response to range seeding is unreliable because rainfall is low and erratic.

The estimated total annual yield per acre is 500 pounds air-dry weight in favorable years and 100 pounds in unfavorable years.

Wild hogs.--Wild hogs thrive in isolated areas near Santa Ynez in the vicinity of Cachuma Lake. They find cover in sagebrush, oak trees, grasses, and chaparral that grow on Chamise, Toomes, and Climara soils. The population of wild hogs is fairly small but is increasing.

Rabbits.--Hunting rabbits is a popular sport in the Area. Brush rabbits live in the coastal areas, and cottontails live in the Cuyama Valley. Rabbits live in widely scattered areas but rarely in areas of dense chaparral. They are numerous in areas of Riverwash and Sandy alluvial land. At times they destroy bean and grain crops and damage apple trees by eating the bark.

California Valley quail.--This is the major game bird in the Area. Quail do not favor open grassland, oak-grassland, or cultivated areas, but they live in most other areas. They especially favor the fringe between open areas and chaparral. They eat the seeds of grass and weeds, the tender green leaves of grasses and annual plants, and insects.

ponds throughout the Area. Lake Twitchell and Lake Cuyama attract flights, but hunting is restricted because these areas are used for other recreational activities. The development of commercial facilities for duck hunting is limited in coastal areas by the high cost of land and in the Cuyama Valley by the shortage of water.

Predators.--Coyote, fox, bobcat, and mountain lion are the main predatory animals in the Area. They kill game animals, many destructive rodents, and, occasionally, domestic animals. Predators are

Metz soils, are too valuable for farming to be used for recreation. However, soils on terraces and low hills, such as Garey, Betteravia, Oceano, Marina, and Tierra soils, are not so valuable for farming and are well suited to the development of dude ranches, hunt clubs, golf courses, picnic areas and playgrounds, and many other recreational facilities. Ranches on uplands inhabited by deer and game birds can be developed for private hunt clubs. In many cases, technical and financial assistance is available for developing land for recreational uses.

used in preparation of engineering reports for a specific area.

8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

The engineering interpretations reported here do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads or excavations deeper than the depth reported (ordinarily about 5 feet). Even in these situations, however, the soil map is useful in planning more detailed field investigations and in indicating the kinds of problems that may be expected.

Some of the terms used by soil scientists have special meanings in soil science that may not be familiar to engineers. These terms are defined in the Glossary.

6/ Prepared by WILLIAM H. PAYNE, civil engineer, Soil Conservation Service.

Soils are grouped in 15 classes. There are eight classes of coarse-grained soils, six classes of fine-grained soils, and one class of highly organic soils.

Soil scientists use the USDA textural classification (14). In this, the texture of the soil is determined according to the proportion of soil particles smaller than 2 millimeters in diameter, that is, the proportion of sand, silt, and clay. Textural modifiers, such as gravelly, stony, shaly, and cobbly, are used as needed.

Table 3 shows the AASHO and Unified classification of specified soils in the Area, as determined by laboratory tests. Table 4 shows the estimated classification of all the soils in the Area according to all three systems of classification.

Table 3 also shows the maximum dry density and optimum moisture content of the soils. Dry density is determined by compacting soil material at successively higher moisture contents, using constant compactive effort, until the maximum dry density is determined. The moisture content is optimum at the point of maximum dry density.

Corrosivity of untreated steel pipe is affected mainly by the electrical resistivity or resistance to flow of current in the soil and the acidity, drainage, and texture of the soil. It is rated low, moderate, or high. Structural materials, such as metal and concrete, corrode when buried in soil, and a given material corrodes more rapidly in some soils than in others. Corrosion is a greater hazard for extensive installations that intersect soil boundaries or soil horizons than for installations in one kind of soil or soil horizon. Some soils have a wide range of characteristics within the profile. Therefore, the depth at which pipes or materials are buried can determine the degree of corrosivity. For example, in a soil that has a clay subsoil, the corrosivity in the surface layer will differ from that in the clay layer. Bayshore, Betteravia, Camarillo, Narlon, Positas, Santa Ynez, Tangair, and Tierra protected by vegetation.

Group A. Soils have high infiltration rate when thoroughly wetted: chiefly deep, well-drained to excessively drained sand, gravel, or both. Rate of water transmission is high; thus, runoff potential is low.

Group B. Soils have moderate infiltration rate when thoroughly wetted: chiefly soils that are moderately deep to deep, moderately well drained to well drained, and moderately coarse textured. Rate of water transmission is moderate.

Group C. Soils have slow infiltration rate when thoroughly wetted: chiefly soils that have layer impeding downward movement of water, or moderately fine textured to fine textured soils that have slow infiltration rate when dry. Rate of water transmission is slow.

Mechanical analyses by California Division of Highways. Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the California procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data used in this table are not suitable for use in naming textural classes for soils.

SCS and BPR (Bureau of Public Roads) have agreed to consider that all soils having plasticity indexes within two points of A-line are to be given a borderline classification. An example of a borderline classification obtained by this use is ML-CL.

5/ NP = Nonplastic.

6/ Many shale fragments, pulverized and dispersed.

				Silty clay.					
[illegible]er: BcE, BcF, [illegible].	1½-3½	(1/)	0-30	Silty clay.	CH	A-7	0	100	[illegible]
			30	Soft mud-stone.					
[illegible]re:									
Ed----------	>6	4->	0-40	Loam-----	CL, ML	A-4, A-6	0	100	[illegible]
			40-60	Silty clay.	CH	A-7	0	100	100
Fe----------	>6	2->	0-40	[illegible]-----	CL, ML	A-4, A-6	0	100	100
			40-60	Fine [illegible].	SM	A-2	0	100	100

See footnotes at end of table.

95-100	90-100	50-60	30-40	0.06-0.20	0.14-0.16	7.9-8.4	3-15	High------	High.
80-90	60-70	25-35	5-15	0.63-2.00	0.16-0.18	7.9-8.4	4-8	Moderate--	Moderate.
95-100	90-100	50-60	30-40	0.2-0.63	0.15-0.17	7.9-8.4	4-8	High------	High.
80-90	60-70	25-35	5-15	0.63-2.00	0.16-0.18	7.9-8.4	4-8	Moderate--	Moderate.
65-75	20-30	-----	NP	6.3-20.0	0.06-0.08	7.9-8.4	4-8	Low-------	Moderate.

				loam.					
			50-60	Loamy sand.	SM	A-2	0	95-100	95-100
Botella:									
BoA, BoA2, BoC, BoD2, BtA, BtA2, BtD2, BtC, BtD2.	>5	(1/)	0-72	Clay loam, silty clay loam, and sandy clay loam.	CL or ML	A-6 or A-7	0	95-100	95-100
BsA----------	>5	3-5	0-72	Clay loam, silty clay loam, and sandy clay loam.	CL or ML	A-6 or A-7	0	95-100	95-100

See footnotes at end of table.

50-60	15-30	-----	NP	6.3-20.0	0.06-0.08	5.6-6.0	0-1	Low-------	Low.
85-95	70-80	35-45	10-30	0.2-0.63	0.19-0.21	5.6-7.3	0-1	Moderate--	Moderate.
85-95	70-80	35-45	10-30	0.2-0.63	0.19-0.21	5.6-7.3	0-1	Moderate--	High.

442-595 O 72 - 9

				loam, loam, or clay loam in some places).					
			18-37	Shaly clay and very shaly heavy clay loam.	GC or SC	A-2 or A-4	0-5	40-70	35-65
			37-60	Very shaly clay loam.	CC	A-1 or A-2	5-15	20-55	15-50
*Climara: CmF-------- For Toomes part, refer to Toomes series.	1½-5	(1/)	0-24	Clay-------	CH	A-7	0	95-100	95-100
			24-37	Silty clay loam.	CL	A-6	0	90-100	85-95
			37	Serpentine rock.					

See footnotes at end of table.

30-60	25-50	40-50	20-30	0.2-0.63	0.08-0.12	5.1-5.5	0-1	Low-------	Low.
10-45	5-35	30-40	10-20	0.2-0.63	0.06-0.10	5.1-5.5	0-1	Low to moderate.	Moderate.
90-100	75-85	50-60	30-40	0.06-0.20	0.14-0.16	7.4-8.4	0-1	High------	High.
80-90	70-80	30-40	20-30	0.2-0.63	0.18-0.20	7.9-8.4	0-1	Moderate--	Moderate.

					or SM	A-2		
CuA, CuC, CuD------	>5	(1/)	0-72	Loamy sand.	SM	A-2	0	95-100	90-95
Cropley: Cv---------	>5	(1/)	0-20	Silty clay.	CH, MH	A-7	0	95-100	95-1
			20-60	Silty clay loam.	CL	A-6	0	100	100
Crow Hill: CwE, CwF, CwC------	2-3½	(1/)	0-4	Loam, silt loam and silty clay loam.	ML	A-4	0	90-100	85-9
			36	Soft diatomaceous shale.					

See footnotes at end of table.

60-70	15-30	-----	[illegible]	6.3-20.0	0.06-0.08	5.6-6.0	0-1	Low------	[illegible]
[illegible]-100	35-[illegible]	[illegible]	20-30	0.06-0.20	0.14-0.[illegible]	7.9-8.4	0-1	[illegible]------	[illegible]
[illegible]-100	85-[illegible]	[illegible]	20-30	0.2-0.63	.19-0.21	7.9-8.4	0-1	[illegible]rate--	[illegible]
[illegible]	70-80	25-35	[illegible]	.2-0.63	0.18-0.20	4.5-6.5	0-1	Low------	[illegible]e.

Carey: CaA2, CaC2, CaE2, CaE3.	>5	(1/)	0-27	Sandy loam to loam.	SM or ML	A-4	0	95-100	95-100
			27-[illegible]	Heavy sandy loam that has indistinct bands.	SM or SC	A-4	0	95-100	95-100
			47-72	Loamy sand.	SM	A-2	0	95-100	95-100
Carey, wet variant: CbB.	>5	2-5	0-33	Loam------	ML	A-4	0	95-100	95-100
			33-72	Loam that has indistinct bands.	CL or ML	A-6	0	95-100	95-100

See footnotes at end of table.

60-80	40-60	-----	NP	2.0-6.30	0.10-0.12	5.1-6.5	0-1	Low-----	Low.
80-90	40-50	-----	NP	0.06-0.20	0.10-0.12	6.1-7.3	0-1	Low-----	Low.
50-70	15-30	-----	NP	0.63-2.00	0.06-0.08	6.1-7.3	0-1	Low-----	Low.
80-90	60-70	15-25	5-10	0.2-0.63	0.16-0.18	5.1-6.0	0-1	Low-----	High.
80-90	60-70	20-30	10-20	0.06-0.20	0.10-0.12	5.6-6.5	0-1	Moderate	High.

			36	Soft marly limestone.					
Iodo: Id3---------	1-1	(1/)	0-11	Loam--------	ML	A-4	0	90-100	85-95
			11	Shale.					
Lopez: Lk1, Lk2---	1-1	(1/)	0-14	Shaly clay loam (loam in places).	SM	A-4	0-10	65-75	60-70
			14	Shale.					
*Los Osos: LoE, LoG, LsE, LsF, LsG3. For San Benito part of LsE, LsF, and LsG3, refer to San Benito series.	1-3½	(1/)	0-12	Clay loam---	CL	A-6 or A-7	0	95-100	90-100
			12-25	Light clay--	CH or MH	A-7	0	90-95	85-95
			25	Shale.					

See footnotes at end of table.

75-85	50-60	15-35	0-10	0.63-2.00	0.16-0.18	5.6-7.3	0-1	Low-------	Low.
50-60	40-50	75-85	0-10	0.63-2.00	0.09-0.10	5.6-7.3	0-1	Low-------	Low.
0-5	70-80	35-45	10-20	0.2-0.63	0.19-0.21	5.6-7.5	0-1	Moderate--	Moderate.
80-90	70-80	50-60	20-30	0.06-0.20	0.14-0.16	7.1-7.8	0-1	Low-------	Low.

				sandy loam, fine sandy loam and loam.					
Ms, Mt----------	>5	(1/)	0-40	Sandy loam.	SM	A-2, A-4	0	100	100
			40-60	Coarse sand and gravel.	GP	A-1	0-10	50-60	30-40
Mv, Mw----------	>5	(1/)	0-60	Loam-------	ML	A-4	0	100	100
Mx----------	>5	(1/)	0-60	Silty clay loam.	CL	A-6	0	100	100

See footnotes at end of table.

60-70	30-40	-----	NP	2.0-6.30	0.11-0.13	7.9-8.4	0-2	Low-------	Low.
20-30	0-5	-----	NP	< 20	0.03-0.05	7.9-8.4	0-2	Low-------	Low.
85-95	60-70	20-35	0-10	0.63-2.00	0.16-0.18	7.9-8.4	0-2	Moderate--	Low.
95-100	80-90	30-40	20-30	0.2-0.63	0.19-0.21	7.9-8.4	0-2	Moderate--	Moderate.

[illegible]: PnA, PnC, PnD------	>5	(1/)	0-32	Sandy loam--	[illegible]	A-2	[illegible]	[illegible]	[illegible]
			32-39	Cobbly clay loam.	CL	A-6	[illegible]	[illegible]	[illegible]
			39-[illegible]	Very cobbly loam and very cobbly sandy loam.	SM	A-[illegible]	15-35	70-[illegible]	60-70
PoE----------	>5	(1/)	0-22	Cobbly sandy loam.	SM	A-2	15-25	[illegible]	[illegible]
			22-30	Cobbly clay loam.	CL	A-6	15-30	90-95	85-95
			30-60	Very cobbly loam, and very cobbly sandy loam.	SM	A-4	15-35	70-80	60-70

See footnotes at end of table.

55-65	20-35	-----		0.63-2.00	0.11-0.19	5.6-7.3	0-1	Low-------	Low.
70-80	60-70	30-40	20-30	0.2-0.63	0.15-0.17	6.1-7.3	0-1	Moderate--	Moderate.
50-60	40-50	20-30	0-10	0.63-2.00	0.08-0.10	6.1-7.3	0-1	Low-------	Low.
45-55	15-25	-----	NP	0.63-2.00	0.08-0.10	5.6-7.3	0-1	Low-------	Low.
70-80	35-50	30-40	20-30	0.2-0.63	0.15-0.17	6.1-7.3	0-1	Moderate--	Moderate.
50-60	40-50	20-30	0-10	0.63-2.00	0.08-0.10	6.1-7.3	0-1	Low-------	Low.

No valid estimates can be made.									
Rough Broken land: RuG. No valid estimates can be made.									
*Salinas:									
SaA, SaC, SeD------ For Sorrento part of SeD, refer to SvA and SvC, Sorrento series.	>5	(1/)	0-20	Loam-------	ML-	A-4	0	90-100	85-100
			20-70	Silty clay loam.	CL	A-6 or A-7	0	90-100	85-100
SbA----------	>5	(1/)	0-60	Loam-------	ML	A-4	-----	90-100	85-100
SdA, SdC-----------	>5	(1/)	0-70	Silty clay loam.	CL	A-6 or A-7	0	90-100	85-100

See footnotes at end of table.

85-95	60-70	30-40	0-10	0.63-2.00	0.16-0.18	7.9-8.4	0-2	Moderate-	Low.
90-100	80-90	35-45	20-30	0.2-0.63	0.19-0.21	7.9-8.4	0-2	Moderate-	Moderate.
85-95	60-70	30-40	0-10	0.63-2.00	0.16-0.18	7.9-8.4	0-2	Moderate-	Low.
90-100	80-90	35-45	20-30	0.2-0.63	0.19-0.21	7.9-8.4	0-2	Moderate-	Moderate.

			32-62	Very gravelly clay.	GC	A-2	5-15	40-55	35-50
SoC, SoE----------	>5	(1/)	0-20	Clay loam.	CL	A-6	0	90-95	85-95
			20-40	Gravelly clay.	CH	A-7	0	75-90	70-85
			40-60	Very gravelly clay.	GC	A-2	0-10	45-55	40-50
Sedimentary rock land: SpG. No valid estimates can be made.									

See footnotes at end of table.

[illegible]-75	60-70	50-60	30-40	<0.06	0.04-0.06	5.6-6.0	0-1	[illegible]-----	[illegible].
30-40	20-30	30-40	15-25	0.06-0.20	0.05-0.07	5.6-6.5	0-1	Low------	Moderate.
75-85	50-60	30-40	10-30	0.2-0.4	0.17-0.19	5.1-6.5	0-1	Moderate-	Moderate.
65-75	60-70	50-60	30-40	<0.06	0.04-0.06	5.6-6.0	0-1	High-----	High.
30-40	20-30	30-40	20-30	0.06-0.20	0.05-0.07	5.6-6.5	0-1	Low------	Moderate.

442-[illegible] O - 72 - 10

Stuarts: Sx, Sy, Sz, Sza, Szb, Szc.	>4	(1/)	0-60	Silty clay loam and silty clay (loamy sand, sandy loam, or loam to a depth of 20 inches in places.)	SM	A-4 or A-7	0	100	100
Swamp: Szw. No valid estimates can be made.									
Tangair: TaA, TaC---	>4	(1/)	0-56	Sand having some concretions.	SM-SP or SM	A-3 or A-2	0	90-100	85-100
Terrace escarpments: TcG, TdF, TeG. No valid estimates can be made.									

See footnotes at end of table.

								to high	
50-60	5-15	-----	NP	6.3-20.0	0.05-0.07	4.5-6.0	0-1	Low-------	Low.

				loam.					

1/ No seasonal high water table within a depth of 5 feet.

2/ Not available.

		Fair to good for gravel: more than 50 percent gravel below a depth of 44 inches.	Good below a depth of 44 inches: A-1.	
Ballinger: BcE, BcF, BcG----	Poor: silty clay-	Unsuitable: more than 50 percent fines.	Poor: high shrink swell; A-7.	C

	hazard.			capacity.	Severe for low slope.
Moderate to very steep slopes; soft mudstone below a depth of 18 to 40 inches; high shrink swell; 8 to 22 percent gypsum.	Low shear strength; high compressibility; low piping hazard.	Slow permeability; soft fractured mudstone below a depth of 18 to 40 inches.	No drainage needed.	Some steep slopes; slow intake; moderate soil depth.	Severe: slope; slow permeability.

	weakly cemented subsoil.	fines. Unsuitable for gravel: less than 25 percent gravel.		
Botella: BoA, BoA2, BoC, BoD2, BsA, BtA, BtA2, BtC, BtD2, BwA.	Fair: sandy clay loam to silty clay loam.	Unsuitable: more than 50 percent fines.	Poor: moderate shrink swell; A-6 and A-7.	B

[illegible] has an occasional water table at a depth of 3 to 5 feet. [illegible] has an occasional [illegible]	Medium to low shear strength; medium piping hazard.	Moderately slow permeability.	No drainage needed. BgA and BwA have occasional hi water table.	Slow intake----	Severe: moderately slo. perme[illegible]y.

Coastal beaches: CnB. No interpretations. Properties too variable.				
Cobbly alluvial land: CoB. No interpretations. Properties too variable.				
*Contra Costa: CrE, CrF, CrG, CsG. For Lodo part, see Lodo series.	Poor: gravelly clay loam subsoil; stony in places.	Unsuitable: more than 50 percent fines.	Poor: moderate shrink swell; A-6.	C

surface layer.					
Moderately steep to very steep slopes; fractured shale at a depth of 18 to 36 inches; moderate shrink swell.	Medium to low shear strength; low to medium piping hazard.	Moderately slow permeability; fractured shale bedrock at a depth of 16 to 36 inches.	No drainage needed.	Moderately steep to very steep slopes; moderate soil depth.	Where: [illegible] pe; moderately slow permeability.

Dam: land: [illegible]. No interpretations. Properties too variable.				
Elder: EdA, EdA2, EdC2, EdD2, EmA, EmC, EnA2, EnC2, EnD2.	Good to fair: sandy loam, loam, and shaly loam.	Poor to [illegible] for sand: 30 to 70 percent fine. Poor to [illegible] for gravel: less than 0 percent gravel.	Good to [illegible]: A-2 [illegible].	B

swell.	hazard.	40 inches.			
Most features favorable.	Low to medi. shear strength; medium to [illegible] hazard.	Moderately rapid to moderate permeability.	No [illegible] needed.	Moderately rapid intake.	Slight for EdA, EdA2, [illegible]. Moderate for [illegible]AC2, EmC, [illegible]. Severe for EdD2, [illegible]C: slope; moderate permeability.

variable.				
Igneous rock land: IrG. No interpretations. Properties too variable.				
Kettleman: KtE, KtE3, KtG.	Fair: soft sandstone at a depth of 6 to 30 inches.	Poor for sand: 35 to 50 percent fines. Unsuitable for gravel: less than 15 percent gravel.	Fair: A-4----------	C
Landslides: LaF. No interpretations. Properties too variable.				

Some steep slopes; soft sandstone at a depth of 6 to 30 inches.	Medium shear strength; medium to high piping hazard.	Moderate permeability; soft sandstone at a depth of 6 to 30 inches.	No drainage needed.	Some steep slopes; moderate intake; moderate soil depth.	Severe: slope; 6 to 30 inches deep over bedrock.

MaE3.			30 percent fines. Unsuitable for gravel: less than 25 percent gravel.		
Marsh: Mh. No interpretations. Properties too variable.					
Maymen: MmG----------	Poor: shallow--------		Poor for sand: 40 to 50 percent fines. Poor to unsuitable for gravel: less than 35 percent gravel.	Fair: A-4---------	D

depth of 50 inches; subject to wind erosion.	strength; medium to high piping hazard.	bility in subsoil.	needed.	ly steep slopes; rapid intake; low water-holding capacity.	Moderate for MaC: slope. Severe for MaE, MaE3: slope.
Very steep slopes; fragmented shale at a depth of 10 to 20 inches.	Medium shear strength; medium piping hazard.	Moderate permeability; fragmented shale at a depth of 10 to 20 inches.	No drainage needed.	Very steep slopes; shallow soil depth.	Severe: shallow depth; slope.

442-385 O - 72 - 11

Mx----------	Fair: silty clay loam.	Unsuitable: more than 50 percent fines.	Poor: moderate shrink swell; A-6.	B
Montara: MyG----------	Poor: shallow-----	Poor for sand: 40 to 55 percent fines. Poor to unsuitable for gravel: less than 50 percent gravel.	Poor: moderate shrink swell; A-6 and A-7.	D
Narlon: NrB, NsA, NsC, NsD.	Poor: loamy sand over clay.	Poor for sand to a depth of 32 inches: 15 to 30 percent fines. Unsuitable for sand below a depth of 32 inches; more than 50 percent fines. Unsuitable for gravel: less than 25 percent gravel.	Surface layer good: A-2. Other layers poor: high shrink swell; A-7.	C

	hazard.				
Most features favorable.	Medium to low shear strength; low to medium piping hazard.	Moderately slow permeability.	No drainage needed.	Most features favorable.	Severe: moderately slow permeability.
Steep slopes; bedrock at a depth of 10 to 20 inches.	Medium to low shear strength; medium piping hazard.	Moderately slow permeability; serpentine bedrock at a depth of 10 to 20 inches.	No drainage needed.	Steep slopes; shallow soil depth.	Severe: shallow depth; slope.
Perched water table during rainy season; high shrink swell.	Medium to low shear strength; medium piping hazard.	Very slow permeability.	Perched water table during rainy season; very slow permeability below a depth of 32 inches; somewhat poor drainage.	Rapid intake; low water-holding capacity.	Severe: very slow permeability.

	Poor below a depth of 32 inches: cobbly clay loam.	fines. Poor to unsuitable for gravel: 5 to 40 percent gravel.	dominantly A-4.	
PoE----------	Poor: cobbly------	Fair to poor for sand: 15 to 50 percent fines. Fair for gravel: 30 to 40 percent gravel.	Fair: dominantly A-4.	B
PrA, PrC, PsD----------	Good to a depth of 28 inches. Poor below a depth of 28 inches: cobbly clay loam.	Poor for sand: 25 to 70 percent fines. Unsuitable to poor for gravel: 5 to 50 percent gravel.	Fair: moderate shrink swell; dominantly A-4.	B

favorable.	strength; medium piping hazard.	permeability.	needed.	favorable.	ately slow permeability.
Considerable number of cobblestones.	Medium shear strength; medium piping hazard.	Moderately slow permeability.	No drainage needed.	Some steep slopes; low water-holding capacity.	Severe: moderately slow permeability.
Most features favorable.	Medium to low shear strength; medium to high piping hazard.	Moderately slow permeability.	No drainage needed.	Most features favorable.	Severe: moderately slow permeability.

For Diablo part, see Diablo series.				
Sandy alluvial land: Sh. No interpretations. Properties too variable.				
Sandy alluvial land, wet: Sk. No interpretations. Properties too variable.				

slopes; bedrock at a depth of 20 to 48 inches.	shear strength; low to medium piping hazard.	permeability; fractured or hard sandstone at a depth of 20 to 48 inches.	needed.	slopes; variable intake; moderate soil depth.	moderately slow permeability.

Shedd, diatomaceous variant: SsE, SsF, SsG.	Fair: silty clay loam.	Unsuitable: more than 50 percent fines.	Poor: moderate shrink swell; A-6.	C

a depth of 18 to 50 inches.	piping hazard.	mudstone at a depth of 18 to 50 inches.		soil depth.	to 50 inches.
Some very steep slopes; diatomaceous shale at a depth of 20 to 54 inches.	Medium to low shear strength; low to medium piping hazard.	Moderate permeability; diatomaceous shale at a depth of 20 to 54 inches.	No drainage needed.	Some very steep slopes; moderate soil depth.	Severe: slope; shale at a depth of 20 to 54 inches.

Swamp: Szw. No interpretations. Properties too variable.				
Tangair: TaA, TaC--------	Poor: sand-------	Good for sand. Unsuitable for gravel: less than 15 percent gravel.	Good: A-2 or A-3---	C
Terrace escarpments, sandy: TcG. No interpretations. Properties too variable.				
Terrace escarpments, loamy: TdF. No interpretations. Properties too variable.				

Sand subject to wind erosion; rapid permeability.	Medium shear strength; medium to high piping hazard.	Rapid permeability.	Somewhat poor drainage; rapid permeability.	Very rapid intake; low water-holding capacity.	Severe: somewhat poor drainage.

fill slopes. Compaction is important for most types of earthfill construction. The degree of compaction

the clay in the soil and reduce the effectiveness of the filter field.

FORMATION AND CLASSIFICATION OF THE SOILS[7/]

This section describes the major factors of soil formation and tells how these factors have affected the soils of the Northern Santa Barbara Area. It also defines the current system for classifying soils and shows the classification of the soils by series and higher categories.

Factors of Soil Formation

The main factors of soil formation are: (1) the physical and mineral composition of the parent material; (2) the climate under which the soil material accumulated and formed; (3) the relief, slope, and position of the soil; (4) the living organisms on and in the soil; and (5) the length of time the soil material has been acted upon by these factors. Changes in the soil mantle caused by man are not considered here as one of the factors of soil formation.

All of these five factors have played some part in the formation of soils. The main features of some soils may be determined by only two or three of these factors. For example, the features of the Oceano soils are largely determined by the sandy parent material and the relative youth of the soil. The effects of slope, living organisms, and climate are not strongly expressed. Where parent material similar to that of Oceano soils has been acted upon over a longer period, Garey soils formed, and in

7/ Prepared by LEWIS C. LEIFER, soil scientist, Soil Conservation Service.

Lucia soils formed in medium to hard, brittle shale in which the siliceous deposits are somewhat cemented. They are examples of soils that have been strongly influenced by their diatomaceous parent material (see laboratory data, table 7). Shedd soils, diatomaceous variant, are underlain by lightweight, highly calcareous shale that is high in content of diatom skeletons. Soils that formed in alluvial material derived mainly from diatomaceous shale have a gray surface layer similar to that of soils that formed in place in this parent material. Most of the diatomaceous shale is of the middle Miocene age, but some impure members are of the middle Pliocene.

Unconsolidated mixed sediments.--This parent material coincides with the Paso Robles Formation of the late Pliocene and early Pleistocene. This formation consists of gravelly and shaly deposits derived mainly from diatomaceous shale, beds of medium-acid sand, and beds of calcareous white marl to soft light-brown shale. Each of these strata within the formation determines to a large extent the characteristics of the soils. Some of the soils in this group are like those that formed in

Eocene ages. Soils of the Maymen and Gaviota series and Sedimentary rock land overlie these formations.

Basic igneous rock formations.--Soils that formed on basic igneous rock formations commonly have redder colors or finer textures than adjacent soils on other formations. The material consists of old, Franciscan metavolcanics or ultrabasic intrusives of the Mesozoic age. The shallow rocky Montara soils formed in the metamorphosed ultrabasic material, and the Toomes and Climara soils formed in the more weatherable material. Soil colors range from dark brown to dark gray, and textures range from moderately fine to fine.

Soft calcareous sandstone and shale.--These formations are only along the edges of the Cuyama Valley. They consist of soft, nonmarine sediments of the Pliocene age. They contain large amounts of lime and gypsum but are otherwise similar to the hard sandstone and shale formations. The lime and gypsum content has significantly affected the Ballinger and Kettleman soils, which overlie these formations.

Young alluvial deposits.--These deposits have been in place for so short a time that living

at Cachuma Dam, about 37 miles inland, it is about 70° F. In winter, temperatures are not greatly influenced by the ocean, though they are slightly warmer nearer the ocean. At Lompoc, the mean temperature in January is 51.8° F.; at Cachuma Dam, it is 49.9° F. Temperature generally decreases with increasing elevation. In July, temperatures inland would be considerably warmer were it not for the higher elevations.

Rainfall generally increases with increasing elevation. However, areas that are screened by mountain ranges from rainstorms that blow off the ocean have considerably lower rainfall than other areas at the same elevation. For example, Cuyama is sheltered by mountain ranges and has an average annual rainfall of 5.47 inches. At Lompoc and Cachuma Dam annual rainfall is 12.65 and 17.12 inches, respectively.

Generally, differences in climate within the Area account for three rather broad groups of soils. Soils in coastal areas have a gray to very dark gray surface layer and a dull-colored subsoil. Nearly all are deeply leached. About 30 to 40 miles inland, the soils generally have a brown surface

Relief determines the elevation, slope, and position of the soil on the landscape. Elevation influences soil formation mainly through its effect on climate. Elevations in the Area range from sea level to about 3,000 feet. Slope and the position of the soil on the landscape affect soil formation through their influence on the movement of water.

Very steep soils generally have rapid runoff. Material is rapidly eroded from the surface, and only a small amount of water passes through the soil to cause leaching and weathering. Plants do not grow well, and the effect of plants and animals on the soils is slight. In general, steeper soils have less soil material available for forming a distinct surface layer and subsoil, are less affected by leaching, and are shallow. Very steep soils erode rapidly and are considered young, even if the parent material is old. These soils strongly reflect the features of the parent material. For example, the characteristics of the Maymen soils have been determined by their very steep slopes. These soils are only 10 to 20 inches deep, the organic-matter enriched surface layer is only about 3 inches thick, and little clay has accumulated in the

the substratum. Stutzville soils occupy basins in the drier parts of the Cuyama Valley. Floodwater and seepage entering the basins have deposited salts that have been concentrated by evaporation and transpiration. These soils are salty and mottled. Tangair soils are more permeable, but are somewhat poorly drained. Originally they were not high in content of bases, but water passing through the profile has made these soils acid. Through long periods of saturation, some iron has been concentrated into hard, concretionary lumps.

Living Organisms

The most extensive type of vegetation in the Area is annual grasses (8). Some forbs and a few perennial grasses grow in places. Most cultivated areas were originally grass. Live oak (Quercus agrifolia) and valley oak (Quercus lobota) grow throughout the grassland. In some places the oaks are very sparse and grow only on north-facing slopes or along drainageways. In others, oaks grow

less apparent. No distinct or major soil features are attributable solely to animal activity. Ground squirrels and pocket gophers prefer to burrow and nest in calcareous soils. The Linne and Shedd soils have two to ten times more burrows than neighboring soils. Differences between horizons in these soils are only weakly defined. These soils are relatively soft and calcareous throughout, features inherited from the parent material, and small pieces of soft shale are commonly scattered throughout the profile. A large volume of soil material is brought to the surface each year and many burrows collapse. The similarity of horizons and lack of usual profile development in these soils may be caused partly by animal activity.

Time

The degree of alteration of parent material by the interacting forces of climate, living organisms, and relief is determined by the length of time these factors have acted on the soils. The oldest

442-593 O - 72 - 12

ture favors longer periods of decomposition, additional clay may be formed through weathering of minerals in the subsoil. Older soils that have clay accumulation in the subsoil, such as Pleasanton and Santa Ynez soils, occur on terrace deposits, soft sediments, shale, and sandstone that weather rather deeply and also provide clay minerals subject to translocation. As clay accumulates in the subsoil, pores become fewer or finer and the permeability is reduced. The differences between the surface layer and subsoil become greater, and the horizon boundaries become more distinct. Water may accumulate just above the clay subsoil causing temporary saturation in the lower part of the surface layer. The Positas soils are classified as Palexeralfs and represent the oldest or most mature soils. The development of hard layers or hardpan-like horizons is generally associated with mature soils, such as Narlon sands, hardpan variant, that have prominent clay accumulations above or below the hard layer. Hard layers generally indicate the great age of a soil.

in the United States in recent years. The older system was adopted in 1938 (3) and revised later (12). The system currently used by the National Cooperative Soil Survey was developed in the early sixties (10) and adopted in 1965 (16). It is under continual study.

The current system of classification has six categories. Beginning with the most inclusive, these categories are the order, the suborder, the great group, the subgroup, the family, and the series. The criteria for classification are soil properties that are observable or measurable, but the properties are selected so that soils of similar genesis are grouped together. The placement of some soil series in the current system of classification, particularly in families, may change as more precise information becomes available.

Table 6 shows the classification of each soil series of the Northern Santa Barbara Area by family, subgroup, and order, according to the current system. The classes in the current system are briefly defined in the following paragraphs.

San Benito-----	Fine-loamy, mixed, thermic----------	Calcic Pachic Haploxeroll--	Mollisols
Santa Lucia-----	Clayey-skeletal, mixed, thermic----------	Pachic Ultic Haploxeroll---	Mollisols.
Santa Ynez-----	Fine, montmorillonitic, thermic----------	Ultic Palexeralf----------	Alfisols.
Shedd 3/-----	Fine-loamy, mixed, calcareous, thermic -----	Typic Xerorthent----------	Entisols.
Shedd, diatomaceous variant.	Fine-loamy, siliceous, calcareous, thermic---	Typic Xerorthent-------- --	Entisols.
Sorrento-----	Fine-loamy, mixed, thermic---- ----------	Calcic Haploxeroll---- -- -	Mollisols.
Stutzville-----	Fine-loamy, mixed, thermic----- ----------	Typic Salorthid----- -----	Aridisols.
Tangair-----	Mixed, mesic----------	Typic Psammaquent- ---	Entisols.
Tierra-----	Fine, montmorillonitic, thermic----------	Mollic Palexeralf-- --------	Alfisols.
Toomes 4/-----	Loamy, mixed, thermic---------- --- ----	Lithic Haploxeroll - -------	Mollisols.
Wasioja-----	Fine-loamy, mixed, thermic----------	Typic Haploxeralf----------	Alfisols.

1/ Agueda loam, 0 to 2 percent slopes, is a taxadjunct to the Agueda series because fine sand is at a depth of 30 to 40 inches.

2/ Crow Hill loam, 15 to 75 percent slopes, severely eroded, is a taxadjunct to the Crow Hill series because the depth to bedrock is 7 to 22 inches.

3/ Shedd soils mapped in this Area are more moist than is appropriate to the range defined for the Shedd series. Their classification has been changed to Balcom series.

4/ Toomes soils mapped in this Area are taxadjuncts to the Toomes series because they lack a cambic horizon and have chromas less than 4.

Great Group

Each suborder is divided into great groups on the basis of the uniformity in the kinds and sequence of major soil horizons and features. The horizons used to distinguish great groups are those in which clay, iron, or humus have accumulated; those that have pans that interfere with the growth of roots and the movement of water; and dark colored surface horizons. Among the features used are soil temperature and moisture, major differences in chemical composition, and color. The name of each great group is made by adding a prefix to the name of the suborder. An example is Argixeroll, Argi meaning an argillic horizon, or a horizon of accumulated illuvial clay, and the suborder Xeroll.

Subgroup

Each group is divided into subgroups. One subgroup represents the central (typic) segment of the

methods used for obtaining the data in table 13 are described in the following paragraphs.

Size class and diameter of particles.--The particle size distribution was determined by pipette and sieve analyses. After treatment of the sample to remove organic matter and soluble salts, the particles were dispersed with sodium hexametaphosphate and by mechanical shaking (17).

Bulk density. The bulk density for one-third bar water content and for oven dryness was determined on saran-coated natural soil clods (17). The clods were equilibrated to one-third bar water content on a pressure plate apparatus, and the volume of the clods was determined by the displacement of water. If the clods contained gravel-size particles, corrections were made for weight and volume and the data were reported for the soil particles less than 2-millimeters in size. The bulk density that was determined on core samples is an estimate that is assumed to be equal to the density of the horizon at field moisture (13). Core samples were taken with a modified Uhland sampler and a core container 4.7 by 3.5 centimeters in size.

	C3	55-75	.3	25.0	40.3	17.2	3.2	9.4	3.9	-----	1.55
	Band[1]	75	-----	----	----	----	----	----	----	-----	[1] 1.87
Santa Lucia shaly clay loam [4] S62-Calif-42-10.	A11	0-8	5.8	8.0	3.8	5.8	3.4	35.3	37.9	[5] .95	[5] .89
	A12	8-17	4.1	6.3	3.4	5.8	4.3	35.8	40.3	1.06	1.02
	A13	17-24	4.7	5.8	3.2	5.6	3.9	34.0	42.8	1.18	1.16
Tangair sand S62-Calif-42-7.	A1	0-4	.7	23.8	36.2	24.2	2.9	10.1	2.1	-----	-----
	A2	4-24	.7	19.8	36.9	27.4	3.5	10.4	1.3	-----	-----
	B21ir	24-36	.3	16.2	37.5	30.5	3.4	7.2	4.9	1.78	1.78
	B22ir	36-48	.9	24.4	37.1	23.8	2.8	8.0	3.0	-----	-----
	C	48-60	1.1	26.9	38.5	24.5	2.4	5.2	1.4	-----	-----

[1] A band horizon; the bulk density is for an air-dry clod and the water content is for a sieved sample.

[2] Trace.

[3] The bulk density is for a core sample at field moisture and the water content is for one-tenth bar.

5.0	2.0	-----	5.2	.03	-----	-----	-----	.3	3.3	.7	.5	.2	.1	1.8	45
1/ 11.6	----	-----												
2/ 47.9	2/40.7	2/ .020	6.0	9.43	.743	-----	-----	---	70.0	29.6	9.2	.5	5.6	24.1	66
54.4	38.0	.014	5.9	6.54	.494	-----	-----	---	69.1	30.0	10.9	.9	2.8	24.5	64
43.0	40.7	.007	5.8	5.55	.443	-----	-----	---	66.9	25.1	12.4	1.0	1.9	26.5	60
----	2.7	-----	6.0	1.06	.061	-----	-----	.1	6.0	2.3	1.0	.2	.2	2.3	62
----	.9	-----	6.4	.20	-----	-----	-----	.1	1.6	.4	.4	.4	.1	.3	81
6.4	1.7	0	5.3	.18	-----	-----	-----	.6	3.6	.4	.6	.3	.1	2.2	32
----	1.0	-----	5.5	0	-----	-----	-----	.2	1.7	.3	.5	.2	.1	.6	65
----	.9	-----	5.4	.04	-----	-----	-----	.1	1.5	.3	.5	.2	.1	.4	73

1/ Individual particles were not completely dispersed. Gravel content is 25 percent in the A11 horizon, 19 percent in the A12 horizon, and 26 percent in the A13 horizon. Fragments larger than three-fourths inch made up 10 percent of the field volume of the A11 horizon and 50 percent of the A12 and A13 horizons.

2/ Data are not from this profile but from a similar profile.

As a rule, temperatures are mild throughout the Northern Santa Barbara Area, although inland, particularly in some of the mountain valleys, they vary considerably more than in coastal areas. The average maximum temperature in July is in the 60's along the coast and in the 90's inland. In January, the average minimum temperature is in the 40's along the coast and in the 30's inland.

Precipitation is concentrated in the 6-month period November through April; very little falls during the rest of the year. The average annual precipitation ranges from 11 inches in some inland areas to 30 inches or more in the higher mountains. Snow falls infrequently and only in a few areas at high elevation.

8/ By C. ROBERT ELFORD, climatologist for California, National Weather Service, U.S. Department of Commerce.

the average low in January is below freezing. Freezing temperatures have been recorded in all parts of the Area at one time or another, and in some cold inland areas temperatures have dropped to 10° F. or lower. In January, even in these cold inland areas, daytime temperatures are comfortable, and the average maximum is in the high 50's or low 60's throughout the Area.

Growing Season.--In a narrow zone along the coast, freezing temperatures are relatively infrequent due to the effect of the ocean. The last 32° F. temperature generally occurs in January near the coast and at successively later dates farther inland. Some mountain areas have a 32° temperature in May in at least half of the years. The first freezing temperature generally occurs after December 31 along the coast and late in October at higher elevations in land. The average length of the growing season based on temperatures of 32° or lower is about 175 days in the mountains and 340 days or more along the coast.

Year	104	83.4	87.0	48.7	11	19.87

1/ Trace.

Figure 2 shows the average length of the growing season throughout the Area.

In the mountain areas, temperatures of 28° F. or lower occur as late as April in spring and as early as November in fall. Along the coast, they occur only very late in December or early in January. The growing season based on temperatures of 28° or lower generally is 200 to 225 days in the mountain areas and 365 days along the coast.

Precipitation.--Precipitation in the Area falls mostly in winter. About 90 percent falls during the 6-month period November through April. Thundershowers sometimes occur in the mountains during the summer, but they do not account for any substantial part of the annual rainfall.

Annual precipitation ranges from considerably less than 10 inches in the Cuyama Valley to more than 30 inches in some areas at high elevations in the mountains. It is generally 20 to 25 inches in the mountains of the southeastern part of the Area, 11 to 15 inches in most of the western half of the Area, and as much as 20 inches or more in some areas at high elevation in the Santa Ynez Mountains and in parts of the San Rafael Mountains. Figure 3 shows the average precipitation throughout the Area.

Precipitation varies considerably from year to year. At low elevations in the western part of the Area, for example, as little as 5 inches falls in the driest years, and as much as 25 inches in the wettest years. In areas of heavy rainfall in the

Figure 2.--Average length of the growing season based on 32° F.

mountains of the eastern part of the Area, annual precipitation ranges from a low of 15 inches to a high of 55 inches within a 20-year period. The western parts of the Area have 10 to 18 inches of precipitation in half the years, whereas mountain areas farther inland have 25 to 40 inches.

The intensity of rainfall also varies considerably from season to season and with location, especially in the mountain areas in the southeastern part of the Area, in the western half of the Area, and the low-rainfall zone in the northeastern corner of the Area.

Relative Humidity.--At Santa Maria, the average relative humidity during the night is 80 percent late in fall and early in winter and 90 percent or more in summer. During the afternoon it is about 60 to 65 percent during most of the year. The range in relative humidity is much greater inland. Occasionally dry winds lower relative humidity below 10 percent.

Figure 3.--Average annual precipitation

Wind.--On the coast, winds blow rather steadily from the northwest during most of the year. The intensity of the northwest wind varies with changes in the weather. During storms in winter, winds usually are from the south. The prevailing wind direction at any given point is considerably affected by local topography.

High winds are infrequent. Available records indicate that, in most of the Area, winds of 60 miles per hour occur once in 50 years. Once in 100 years, winds are 65 miles per hour inland and about 80 miles per hour along the coast.

Sunshine and Cloudiness.--Cloudiness caused by migrating storms is uncommon in the Area, but there is a considerable amount of stratus cloudiness along the coast and in the coastal valleys. Annually, the sun shines about 60 to 70 percent of the possible time at Santa Maria, and nearly 80 percent of the time during the fall. Somewhat more sunshine is likely inland.

About 60 to 80 days each year are cloudy. The rest are partly cloudy or clear, and the sun shines approximately half or more of the day.

Santa Ynez River drains the southern part. All empty into the Pacific Ocean. Floodwater from the Cuyama River is controlled by Twitchell Dama and is released periodically to replenish the ground water in the Santa Maria Valley. Floodwater from the Santa Ynez River is controlled by Cachuma Dam. The water is supplied to coastal areas in the vicinity of Santa Barbara and is released periodically to replenish the ground water in the Lompoc Valley.

Four fairly large valleys are in the Area. Each has fairly extensive areas of nearly level alluvial soils. The Cuyama Valley is along the Cuyama River

Between Casmalia and the Lompoc Valley, within a few miles of the ocean, are sand dunes and older sandy marine sediments that have a rolling, hummocky and mesalike topography. Burton mesa, in the Vandenberg Air Force Base, is the largest of these areas. It is a nearly level or rolling sandy mesa that is dissected on all sides by deeply entrenched drainages. Rolling sand dunes occur along the coast in the Vandenberg Air Force Base and west of Guadalupe. Older sand dunes occur along the coast in the Vandenberg Air Force Base west of the Lompoc Valley.

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GLOSSARY

Acre-foot. The quantity of water, soil, or other material that will cover 1 acre to a depth of 1 foot.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or other disturbances.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern.

Available water capacity. The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Bedrock. The solid rock underlying soils.

rather than to pull free from other material.

Hard.- When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.--When dry, breaks into powder or individual grains under very slight pressure.

Cemented.--Hard and brittle; little affected by moistening.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the formation of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and very rapidly permeable and have a low water-holding capacity.

and in proper balance, for the growth of specified plants, when other growth factors such as light, moisture, temperature, and the physical condition of the soil are favorable.

Forb. Any herbaceous plant, neither a grass nor a sedge, that is grazed on western ranges.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rains. The distinction between gully and rill is one of depth. A gully generally is on obstacle to farm machinery and is too deep to be obliterated by normal tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage. V-shaped gullies result if the material is more difficult to erode with depth; whereas U-shaped gullies result if the lower material is more easily eroded than that above it.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material may be sandy to clayey, and it may be cemented by iron

Leaching. The removal of soluble materials from soils or other material by percolating water.

Leveling (of land). The reshaping of the soil surface to make for a more uniform application of irrigation water.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance--few, common, and many; size--fine, medium, and coarse; and contrast--faint, distinct, and prominent. The size measurements are these: fine, less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; medium, ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and coarse, more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell notation. A system for designating color by degrees of the three simple variables--hue,

Relief. The elevations or inequalities of a land surface, considered collectively.

Rill. A steep-sided channel resulting from accelerated erosion. A rill normally is a few inches in depth and width and is not large enough to be an obstacle to farm machinery.

Runoff, surface. External soil drainage or rate at which water flows over the surface of the soil. Six classes are ponded, very slow, slow, medium, rapid, and very rapid.

Saline soil. A soil that contains soluble salts in amounts that impair growth of plants but htat does not contain excess exchangeable sodium.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Sedimentary rock. A rock composed or particles deposited from suspension in water. The chief

material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles of clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are--platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar, (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are (1) single grain (each grain by itself, as in dune sand) or (2) massive (the particles adhering together without any regular cleavage, as in some claypans and hardpans).

gated, and difficult to till.

Topsoil. A presumed fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Variant, soil. A soil having properties sufficiently different from those of other known soils to suggest establishing a new soil series, but a soil of such limited known area that creation of a new series is not justified.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Workability, soil. The ralative amount of work required to till the soil and the relative difficulty in using farm machinery.

Be	Bayshore loam, sandy substratum, drained-------	19	IIw-2(14)	89	----------	---	95
Bg	Bayshore silty clay loam-----------------------	19	IIIw-2(14)	90	----------	---	86
Bh	Bayshore silty clay loam, drained -------------	19	IIw-2(14)	89	----------	---	86
BmA	Betteravia loamy sand, 0 to 2 percent slopes---	20	IVe-4(14), VIe-4(15)	90 93	Sandy	109	50
BmA3	Betteravia loamy sand, 0 to 2 percent slopes, severely eroded-----------------------------	21	VIIe-4(15)	94	Eroded or Shallow Sandy	109	34
BmC	Betteravia loamy sand, 2 to 9 percent slopes---	21	IVe-4(14), VIe-4(15)	90 94	Sandy	109	38
BnB2	Betteravia loamy sand, dark variant, 0 to 5 percent slopes, eroded---- -----------------	22	IVe-4(14), IVe 4(15)	90 93	Sandy	109	47
BnD2	Betteravia loamy sand, dark variant, 5 to 15 percent slopes, eroded ----------------------	22	IVe-4(14), IVe-4(15)	90 93	Sandy	109	39
BoA	Botella loam, 0 to 2 percent slopes-----------	23	I-1(14)	87	----------	---	95
BoA2	Botella loam, 0 to 2 percent slopes, eroded---	23	IIe-1(14), IIe-1(15)	88 92	Loamy	107	71
BoC	Botella loam, 2 to 9 percent slopes-----------	23	IIe-1(14), IIe-1(15)	88 92	Loamy	107	77
BoD2	Botella loam, 2 to 15 percent slopes, eroded--	23	IIIe-1(15)	92	Loamy	107	48
BsA	Botella loam, slightly wet, 0 to 2 percent slopes---------- ------------------	24	IIw-2(14)	89	----------	---	67
BtA	Botella clay loam, 0 to 2 percent slopes------	24	I 1(14)	87	----------	---	73

U. S. GOVERNMENT PRINTING OFFICE : 1962 O - 642-[illegible]

	slopes					
	Contra Costa	--	VIe-1(15)	93	Loamy	107	25
	Lodo	--	VIe-1(15)	93	Shallow Loamy	108	25
CrF	Contra Costa-Lodo loams, 30 to 45 percent slopes	31					
	Contra Costa	--	VIe-1(15)	93	Loamy	107	18
	Lodo	--	VIe-1(15)	93	Shallow Loamy	108	18
CrG	Contra Costa-Lodo loams, 45 to 75 percent slopes	31	VIIe-1(15)	94	Steep Loamy	108	13
CsG	Contra Costa-Lodo stony loams, 30 to 75 percent slopes	31	VIIe-1(15)	94	Steep Loamy	108	11
CtA	Corralitos sand, 0 to 2 percent slopes	32	IVe-4(14), IVe-4(15)	90 94	Sandy	109	48
CtD	Corralitos sand, 2 to 15 percent slopes	32	IVe-4(14), VIe-4(15)	90 94	Sandy	109	38
CtD2	Corralitos sand, 9 to 15 percent slopes, eroded	32	VIe-4(15)	94	Sandy	109	29
CuA	Corralitos loamy sand, 0 to 2 percent slopes	32	IIIs-4(14), IVe-4(15)	90 93	Sandy	109	64
CuC	Corralitos loamy sand, 2 to 9 percent slopes	32	IIIs-4(14), IVe-4(15)	90 93	Sandy	109	58
CuD	Corralitos loamy sand, 9 to 15 percent slopes	32	IVe-4(14), VIe-4(15)	90 93	Sandy	109	45
Cv	Cropley silty clay	33	IIs-5(14)	89	----------	---	67
CwE	Crow Hill loam, 15 to 30 percent slopes	34	IVe-1(15)	92	Loamy	107	31
CwF	Crow Hill loam, 30 to 45 percent slopes	34	VIe-1(15)	93	Loamy	107	24

GaE3	Garey sandy loam, 5 to 30 percent slopes, severely eroded	40	VIIe-1(15)	94	Shallow Loamy	108	18
GbB	Garey loam, wet variant, 0 to 5 percent slopes	41	IIw-2(14)	89	Loamy	107	38
GmD	Gaviota sandy loam, 5 to 15 percent slopes	42	VIe-1(15)	93	Shallow Loamy	108	31
GmE	Gaviota sandy loam, 15 to 30 percent slopes	42	VIe-1(15)	93	Shallow Loamy	108	25
GmG	Gaviota sandy loam, 30 to 75 percent slopes	42	VIIe-1(15)	94	Shallow Loamy	108	14
GsD	Gazos clay loam, 9 to 15 percent slopes	43	IVe-1(15)	92	Loamy	107	33
GsE	Gazos clay loam, 15 to 30 percent slopes	43	IVe-1(15)	92	Loamy	107	30
GsF	Gazos clay loam, 30 to 45 percent slopes	43	VIe-1(15)	93	Loamy	107	19
GsG	Gazos clay loam, 45 to 75 percent slopes	43	VIIe-1(15)	94	Steep Loamy	108	11
GuE	Gullied land	43	VIIIe-1(14)	91	----------	---	5
IrG	Igneous rock land	43	VIIIs-1(15)	95	----------	---	5
KtE	Kettleman fine sandy loam, 9 to 30 percent slopes	44	VIIe-9(15)	94	Arid Loamy	109	35
KtE3	Kettleman fine sandy loam, 15 to 30 percent slopes, severely eroded	44	VIIe-9(15)	95	Arid Loamy	109	27
KtG	Kettleman fine sandy loam, 30 to 75 percent slopes	44	VIIe-9(15)	95	Arid Loamy	109	17
LaF	Landslides	45	VIIe-5(15)	94	Shallow Clayey	107	12
LcD	Linne clay loam, 9 to 15 percent slopes	46	IIIe-1(15)	92	Clayey	107	36
LcE	Linne clay loam, 15 to 30 percent slopes	46	IVe-1(15)	92	Clayey	107	33
LcF	Linne clay loam, 30 to 45 percent slopes	46	VIe-1(15)	93	Clayey	107	26
LcG	Linne clay loam, 45 to 75 percent slopes	46	VIIe-1(15)	94	Clayey	107	15
LdG	Lodo loam, 30 to 75 percent slopes	47	VIIe-1(15)	94	Shallow Loamy	108	14
LkG	Lopez rocky loam, 75 to 100 percent slopes	47	VIIIs-1(15)	95	----------	---	6

Mx	Mocho silty clay loam----------	55	I-1(14)	87	----------	---	90
MyG	Montara rocky clay loam, 30 to 75 percent slopes----------	55	VIIe-9(15)	95	Shallow Loamy	108	12
NrB	Narlon sand, 0 to 5 percent slopes----------	56	VIe-4(15)	94	Sandy	109	27
NsA	Narlon loamy sand, 0 to 2 percent slopes-------	57	IVe-3(15)	93	Sandy	109	43
NsC	Narlon loamy sand, 2 to 9 percent slopes-------	57	IVe-3(15)	93	Sandy	109	34
NsD	Narlon loamy sand, 9 to 15 percent slopes------	57	VIIe-4(15)	94	Sandy	109	27
NvA	Narlon sand, hardpan variant, 0 to 2 percent slopes----------	58	IVe-4(14), VIe-4(15)	90 94	Sandy	109	29
NvC	Narlon sand, hardpan variant, 2 to 9 percent slopes----------	58	IVe-4(14), VIe-4(15)	90 94	Sandy	109	26
OcA	Oceano sand, 0 to 2 percent slopes----------	59	IVe-4(14), VIe-4(15)	90 94	Sandy	109	48
OcD	Oceano sand, 2 to 15 percent slopes----------	59	IVe-4(14), VIe-4(15)	90 94	Sandy	109	38
OcD3	Oceano sand, 2 to 15 percent slopes, severely eroded----------	60	VIIe-4(15)	94	Eroded or Shallow Sandy	109	25
PcA	Panoche sandy loam, 0 to 2 percent slopes------	60	I-1(17)	95	----------	---	95
PcC	Panoche sandy loam, 2 to 9 percent slopes------	61	IIe-1(17)	96	Arid Loamy	109	86
PdA	Panoche sandy loam, overflow, 0 to 2 percent slopes----------	61	IIw-1(17)	96	----------	---	68

SdC	Salinas silty clay loam, 2 to 9 percent slopes-	67	IIe-1(14)	88	----------	---	73
SeD	Salinas and Sorrento loams, 9 to 15 percent slopes----------	67	IIIe-1(15)	92	Loamy	107	57
SfD	San Andreas-Tierra complex, 5 to 15 percent slopes----------	68					
	San Andreas----------	--	IVe-3(15)	93	Loamy	107	36
	Tierra----------	--	IVe-3(15)	93	Claypan	108	36
SfE	San Andreas-Tierra complex, 15 to 30 percent slopes----------	68					
	San Andreas----------	--	VIe-3(15)	93	Loamy	107	29
	Tierra----------	--	VIe-3(15)	93	Claypan	108	29
SfF3	San Andreas-Tierra complex, 9 to 45 percent slopes, severely eroded----------	68					
	San Andreas----------	--	VIIe-1(15)	94	Shallow Loamy	108	25
	Tierra----------	--	VIIe-1(15)	94	Claypan	108	25
SfG	San Andreas-Tierra complex, 30 to 75 percent slopes----------	69					
	San Andreas----------	--	VIIe-1(15)	94	Steep Loamy	108	16
	Tierra----------	--	VIIe-1(15)	94	Claypan	108	16
SgF	San Benito-Diablo complex, 30 to 45 percent slopes----------	69	VIe-5(15)	94	Clayey	107	19
SgG	San Benito-Diablo complex, 45 to 75 percent slopes----------	70	VIIe-5(15)	94	Clayey	107	14
Sh	Sandy alluvial land----------	70	VIIw-4(14)	91	Sandy Alluvial	109	24
Sk	Sandy alluvial land, wet----------	70	VIIw-9(14)	91	Saline	110	24

SvA	Sorrento loam, 0 to 2 percent slopes	77	I-1(14)	87	---	---	100
SvC	Sorrento loam, 2 to 9 percent slopes	77	IIe-1(14)	88	---	---	86
SwB2	Sorrento clay loam, 0 to 5 percent slopes, eroded	77	IIe-1(14)	88	---	---	65
Sx	Stutzville loamy sand	78	IIIs-6(17)	96	Saline	110	61
Sy	Stutzville sandy loam	78	IIs-6(17)	96	Saline	110	73
Sz	Stutzville loam	78	IIs-6(17)	96	Saline	110	76
Sza	Stutzville loam, strongly saline	78	IIIs-6(17)	96	Saline	110	72
Szb	Stutzville silty clay loam	79	IIs-6(17)	96	Saline	110	65
Szc	Stutzville silty clay loam, strongly saline	79	IIIs-6(17)	96	Saline	110	57
Szw	Swamp	79	VIIw-9(14)	91	Saline	110	5
TaA	Tangair sand, 0 to 2 percent slopes	80	VIe-4(15)	94	Sandy	109	24
TaC	Tangair sand, 2 to 9 percent slopes	80	VIe-4(15)	94	Sandy	109	19
TcG	Terrace escarpments, sandy	80	VIIe-4(15)	94	Eroded or Shallow Sandy	109	2
TdF	Terrace escarpments, loamy	80	VIIe-1(15)	94	Shallow Loamy	108	8
TeG	Terrace escarpments, cobbly	81	VIIe-1(15)	94	Shallow Loamy	108	5
TmC	Tierra loamy sand, 2 to 9 percent slopes	82	VIe-3(15)	93	Claypan	108	29
TmE	Tierra loamy sand, 9 to 30 percent slopes	82	VIe-3(15)	93	Claypan	108	18
TnC	Tierra sandy loam, 2 to 9 percent slopes	82	IIIe-3(14), IVe-3(15)	90 93	Claypan	108	34
TnD2	Tierra sandy loam, 9 to 15 percent slopes, eroded	82	IVe-3(15)	93	Claypan	108	23
TnE2	Tierra sandy loam, 15 to 30 percent slopes, eroded	82	VIe-3(15)	93	Claypan	108	18